eyeheight

LE-2

Legaliser module with composite, RGB and YCC gamut correction

user manual

User Manual Versions

Versions	Changes	Date	S/W Ver
1.0	First Version	16/06/08	1.00
1.1	Comp/RGB mode added	18/11/08	1.03
1.2	User memories and user presets and user preset settings updated.	04/12/08	1.04
1.3	Added new section explaining how presets are disabled when the unit has just been powered up without video and menu locking/unlocking	25/01/10	1.15
1.4	Added blanking, settings restored when video standard changed, tamper locking of user menus	18/02/10	2.0
1.5	Change to new single piece 3G compatible hardware	02/06/10	2.0
1.6	Corrected EBU-R103 references	15/09/10	2.0
1.7	Added KARMAudioRT option	13/01/11	2.1
1.8	Changes for revised software	01/08/12	4.0
1.9	Changes for revised software, mostly dual link changes	22/10/12	4.1

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System Overview

This manual describes the function of the **LE-2**. The **LE-2** is a geNETics processing card which fits into a single slot of the eyeheight etherbox (FB-9E). This manual must be used in conjunction with the etherbox manual which contains much of the generic information common to all eyeheight **geNETics** products.

1.1 The LE-2 Product

The **LE-2** is a full-featured legaliser system with audio levelling using the **geNETics** platform. The main features of the LE-2 are as follows:

- Available in Standard Definition, Multi-rate or Dual Link versions.

- Provides Legalisation of the SD SDI input (Standard Definition version) SD/HD SDI Input signal with full 10 bit processing throughout (MultiDef version), or 12 bit for dual-link 4:4:4 (Dual Link version).
- Composite, YCC (Component) and RGB colour spaces.
- Two Independent SD/HD SDI outputs, each changeable between "Legalised", “Raw” and “Indicate” out.
- Adjustable Clipping Levels.
- Adjustable soft clipping knee levels.
- Highly effective overshoot and undershoot suppression on the luminance signal.
- Integral luma and chroma gain, black level adjustment & hue rotation.
- EBU-R103 standard legalisation settings.
- 7.5 IRE or 0 IRE Pedestal.
- KarmAudio loudness levelling with True Peak adjustment and 1770 short term and momentary real time levelling algorithms.
- 6 User Memories.
- Log output with Time code and PC viewer programme.
- Severity display mode on monitoring output.
- 2 off On-board GPI’s for memory recall.
- Compatible with etherbox GPI/Tallies.
- FULLY software and firmware updatable using Flash technology.
- On-Board simple text based RS232 automation protocol. Compatible with eyeheight **geNETics** automation protocol.
- Mechanical relay bypass available.

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Figure 1: LE-2U Processing card.

Figure 2: LE-2S and LE-2M Processing card.

1.2 Associated Equipment for the LE-2

The **LE-2** processing card requires the following in order to set up and operate the unit.

1. An etherbox chassis (FB-9E). Up to six **LE-2** units and be installed in one chassis.
2. A Flexipanel control surface such as an FP-9 or an FP-10.

Figure 3: Front view of etherbox (FB-9E) fitted with FF-9 blank panel

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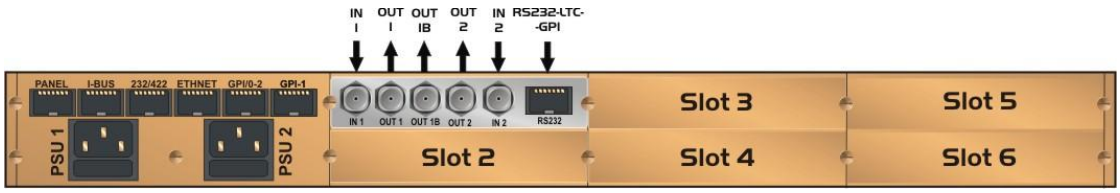

Figure 4: Rear view of etherbox with a single LE-2 installed.

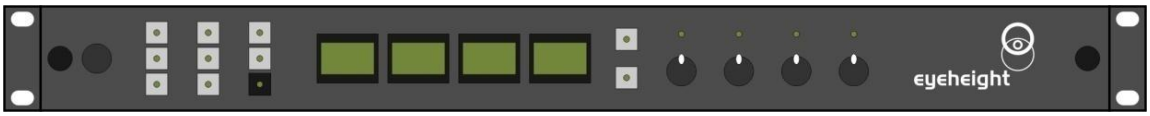

Figure 5: FP-9 Flexipanel can be fitted on the FB-9E or remotely using and RR-9 kit.

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2 Installation

This unit requires HD SDI or SD SDI digital video connections to the BNC connectors. Optionally RS232, GPI's and LTC may also be connected normally using CAT5e or better cable. The user should refer to the etherbox user manual for installation of the **LE-2** into a chassis and connection of flexipanels. This will also describe the process of acquiring a processing card (in this case the **LE-2**) by the Flexipanel which is necessary to access the menu structure within the **LE-2**.

2.1 Connections on the LE-2 product

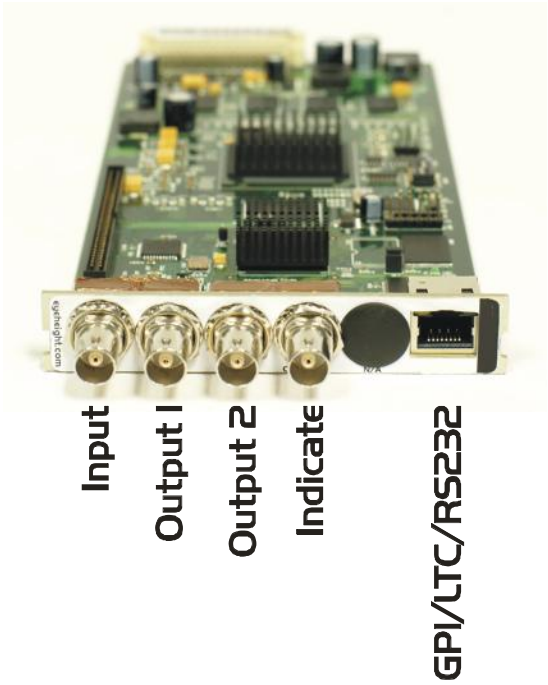

Figure 6: LE-2S or LE-2M connections

The main video connections to the **LE-2S or LE-2M** are shown above. Outputs 1 and 2 are the legaliser outputs. The Indicate output is configurable independently as either Legal, Raw or Indicate outputs. The RS232/GPI/LTC connection pin-outs are shown in the technical appendix at the end of this manual. The RS232 connection can be connected to the COM port of a PC with the eyeheight "Error Logging Application" for QA (Quality Assessment) recording purposes. The LTC connection will allow for accurate time code stamping for the QA.

The RS232 can alternatively be used to recall user memories and presets with a simple text based RS232 protocol.

Three GPI's can be used to recall user memories 1 and 2 respectively.

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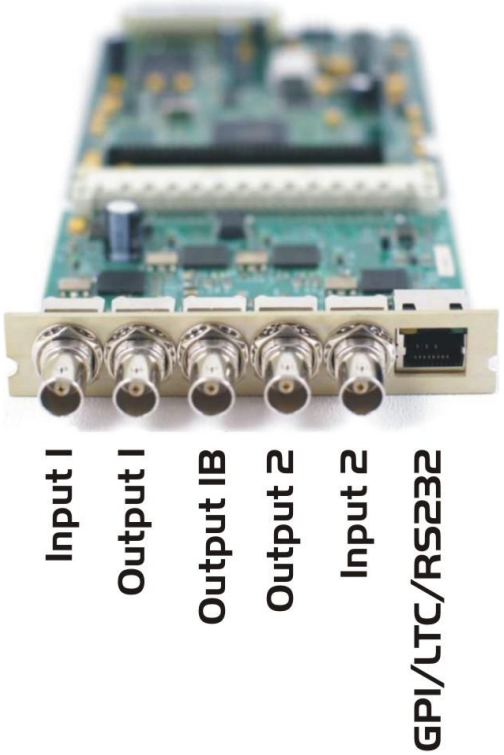

Figure 7: LE-2U connections

The main video connections to the **LE-2U** are shown above. Input 1 is for Link A and Input 2 is for Link B. Outputs 1 and 2 are the legaliser Link A outputs and Output 2 is the Link B output. The RS232/GPI/LTC connection pin-outs are shown in the technical appendix at the end of this manual. The RS232 connection can be connected to the COM port of a PC with the eyeheight "Error Logging Application" for QA (Quality Assessment) recording purposes. The LTC connection will allow for accurate time code stamping for the QA.

The RS232 can alternatively be used to recall user memories and presets with a simple text based RS232 protocol.

Three GPI's can be used to recall user memories 1 and 2 respectively.

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3 Operation

All GeNETics products are controlled using a generic menu system. This generic menu system is operated from a generic panel (Flexipanel FP-9 or FP-10). An FP-9 is shown below (An FP-10 has the same controls in a different layout style). For information about acquiring processor cards for control on a Flexipanel see the etherbox manual section 4.

3.1 General Flexipanel controls

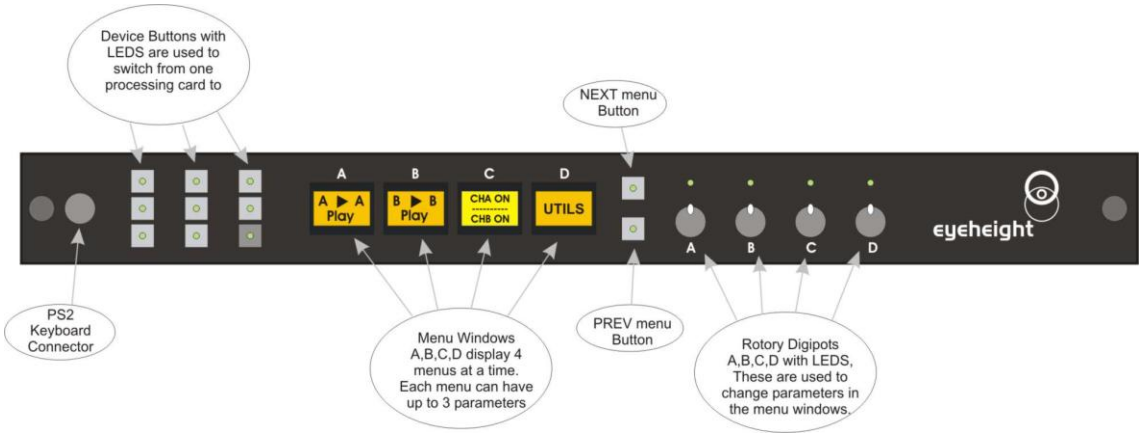
Device Buttons with LEDS are used to switch from one processing card to
NEXT menu Button
A
B
C
D
A ▶ A Play
B ▶ B Play
CHA ON
CHB ON
UTILS
eyeheight
PS2 Keyboard Connector
Menu Windows A,B,C,D display 4 menus at a time. Each menu can have up to 3 parameters
PREV menu Button
Rotory Digipots A,B,C,D with LEDS, These are used to change parameters in the menu windows.

Figure 8: Flexipanel (FP-9) controls.

3.1.1 Device Buttons

There are 8 grey device buttons. These switch between the currently selected processing cards installed in the etherbox. It is also possible to select cards in another chassis if the I-Bus is connected to the other chassis.

3.1.2 Menu Navigation

There are two ways to navigate from menu to menu.

1. Using the NEXT and PREV buttons. These are for “Flat” menu structures. The NEXT and PREV LEDS will flash while further menus are available.
2. Using a GOTO ANOTHER MENU LCD button (as below coloured orange). This is more common and will take you straight to a relevant set of menus. Examples are the Play and UTILS menu’s shown on Figure 8.

Figure 9: Types of menus showing their characteristic colours

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3.1.3 Parameter adjustment of a green menu

A green menu is one in which there is only one adjustable parameter. There are two ways to adjust the parameter in a green menu.

1. Press the green LCD button. This will increment the value in that window. This is most frequently done when the menu parameter is Textural for example switching a parameter between ON and OFF. In this case a button press is most natural.
2. Use the Rotary digipot (A, B, C or D) to adjust the parameter in the respective LCD window (A, B, C or D). The direction and speed of rotation enable numeric values to be set easily.

3.1.4 Parameter adjustment of a red menu

A red menu is one in which there is two or three adjustable parameters. In this case it is necessary to first select the menu by pressing the red button. When the red button is pressed it will turn green and either two or three of the rotary digipot LEDS will flash indicating that the respective rotary digipot will operate the respective parameter.

3.1.5 Information display

A Yellow menu (Which on most panels does look a light orange!) is one in which only information is displayed. An example of this is the software version display.

3.2 Setting up the LE-2

A Block diagram of the video legaliser is shown in Figure 10. Each section is discussed below.

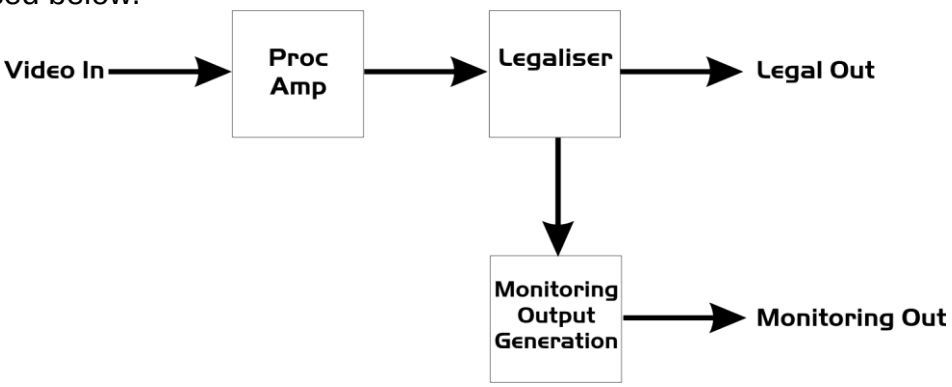

Figure 10: Basic Legaliser Structure

3.2.1 Legaliser

The legaliser operates in one of three modes; RGB, YCC (component) or Composite. The mode is selected via the top level mode menu. Each mode is discussed below. In all modes the legaliser is transparent to pixels within the legal range.

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3.2.2 Selecting the legalisation type

This is a view of the top-level display of the LE-2:

Menus 00-03: Top Level Menus

To select the audio levelling required Press menu A to cycle through the available options. These are:

- Audio Bypass – No audio processing is done. The embedded audio is passed through untouched and not regenerated.
- Audio Lim 1770-15ML – This applies “Momentary” mode (0.4S window) audio loudness correction to -15LKFS. This is a suggested value from the PLOUD committee for material which cannot be corrected by the full 1770-1 or 1770-2 specification. Using this will result in a fast responsive loudness correction than the 1770-20SL. Corrective gain changes will be more frequent.
- Audio Lim 1770-20SL – This applies “Short Term” mode (3.0S window) audio loudness correction to -20LKFS. This is a suggested value from the PLOUD committee for material which cannot be corrected by the full 1770-1 or 1770-2 specification. Using this will result in a slower response loudness correction than the 1770-15ML. Corrective gain changes will be less frequent.
- Audio Lim User Def – This takes the settings that the user sets and leaves from the KarmAudio setup menus whilst in this mode. See link below [KARMAudioRT Loudness and true-peak control]

To select the type of legalisation required, press menu B to cycle through the available options. These are:

- Video Legal off – no processing of the input video will be performed by the **LE-2**.
- Video Legal RGB – the picture will be RGB legalised according to the RGB clip and knee settings.
- Video Legal YCC – the picture will be YCC legalised according to the YCC clip and knee settings.
- Video Legal Comp – the picture will be Composite legalised according to the Composite clip and knee settings.
- Video Legal Comp + RGB – the picture will be firstly Composite legalised, and then RGB legalised.

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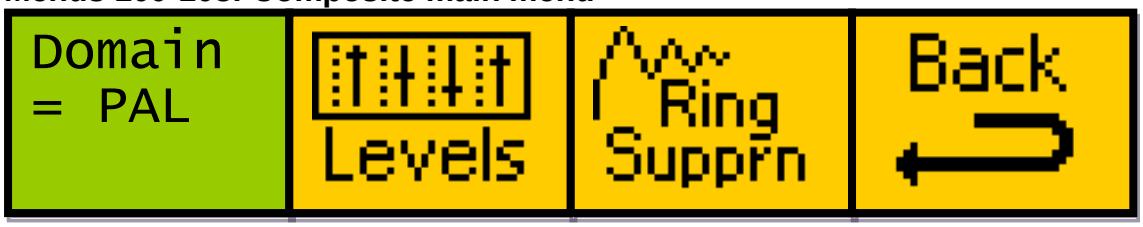
3.2.3 Setting the legaliser domain

It is important to note that in order for the unit to do the correct colour space conversion required, the manner in which the data is converted needs to be specified. This must be done regardless of which type of legalisation is required!

This is selected from the below menu found by navigating to Setup→Comp:

Menus 100-103: Composite main menu



The domain options are listed below:

- Auto – This uses the frame rate to calculate which conversion to use
  - 29.97fps, 30fps, 59.94fps and 60fps means NTSC with pedestal (7.5IRE) will be used
  - 25fps and 50fps means PAL will be used
  - Other detected standards, including 23.98fps and 24fps will use PAL colour space conversion when in auto mode.
- PAL
- NTSC
- NTSC with 7.5 IRE offset (a.k.a. pedestal)

The unit default mode is 'Auto'.

The domain has an effect on a certain number of menus which will display either in mV or in IRE. For a few menus, different values are stored for each mode, so (for example) switching from PAL to NTSC will switch to using the NTSC menus for those few variables, rather than converting the PAL values into NTSC equivalents.
The values treated in this way are listed below:

- High Comp Y clip and knee
- Low Comp Y clip and knee
- High Comp C clip and knee
- Low Comp C clip and knee
- Proc amp gain, black lift value
- Ring suppression high and low clip

3.2.4 Selecting the legaliser values

RGB legalisation

Setting the RGB legaliser values is done via the below menus, which is found under Setup→RGB/YCC→RGB Setup

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Menus 36-39: RGB high clip and knee

The basic form of the RGB legaliser is shown in Figure 11. In RGB mode the legaliser first converts the video from the YCbCr colour space to the RGB colour space. The RGB data is then soft clipped according to the settings for RGB High Clip & Knee and RGB Low Clip & Knee. Finally the clipped RGB data is converted back to the YCbCr colour space. The RGB legal colour space is a subset of the composite legal colour space so an RGB legal signal is also composite legal but the reverse is not true.

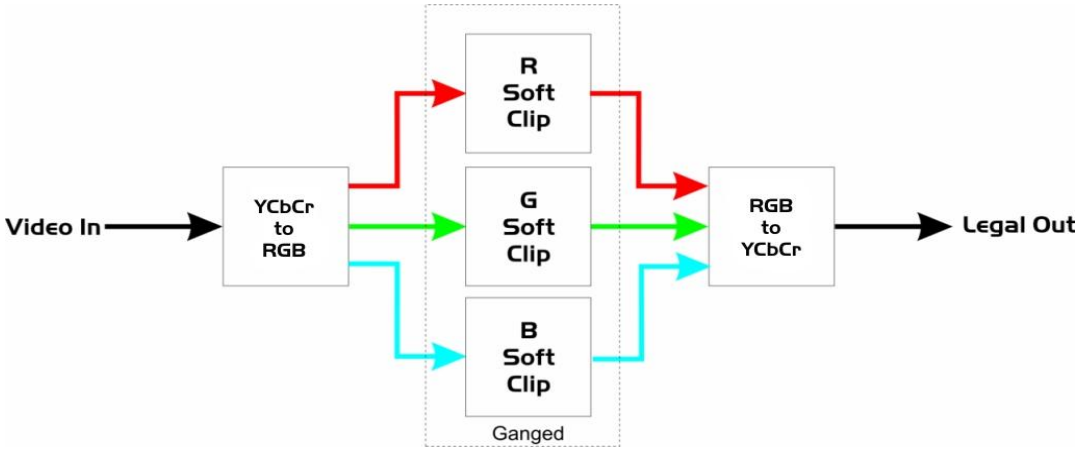
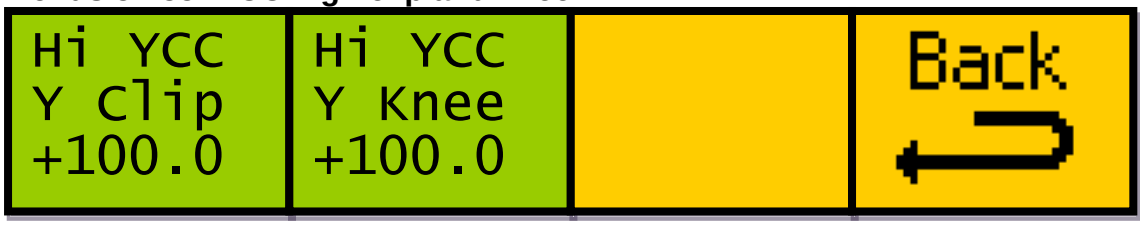


Figure 11: RGB Legaliser Structure

YCC Legalisation

Setting the YCC legaliser values is done via the below menus, which are found under Setup→RGB/YCC→YCC Setup

Menus 52-55: YCC high clip and knee



The basic form of the YCC legaliser is shown in Figure 12: YCC Legaliser Structure. In YCC mode the legaliser provides direct clipping of the raw YCbCr data using separate clip and knee parameters for the Y and colour difference components.

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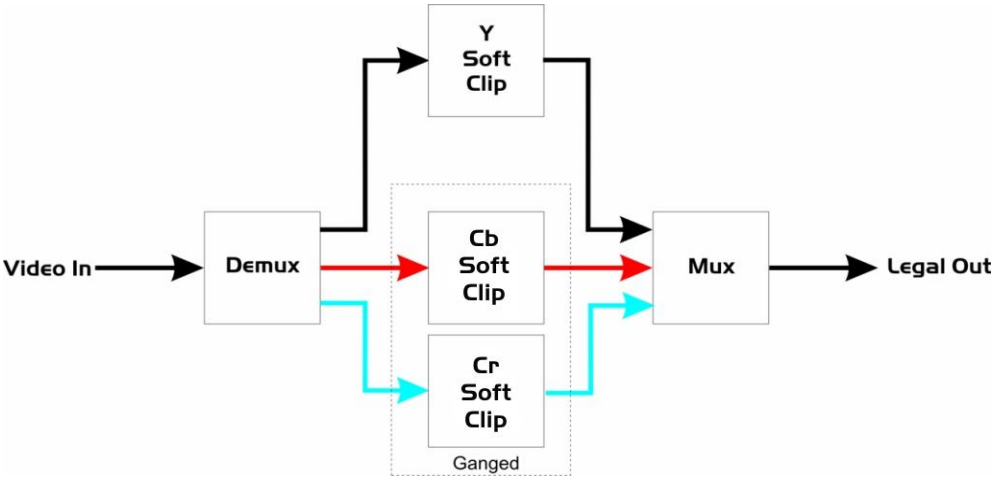
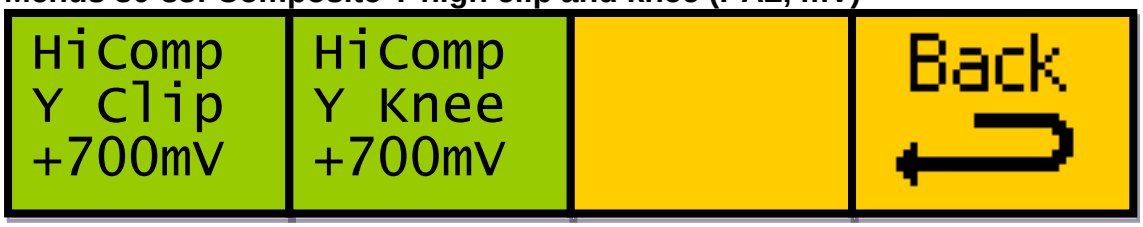


Figure 12: YCC Legaliser Structure

Composite legalisation

Setting the YCC legaliser values is done via the below menus, which are found under Setup→RGB/YCC→YCC Setup

Menus 80-83: Composite Y high clip and knee (PAL, mV)



The basic form of the composite legaliser is shown in Figure 13: Composite Legaliser Structure**Error! Reference source not found.**. In composite mode the legaliser restricts the Y, Cb & Cr components such that when the signal is converted to a composite waveform the Y component stays within the range allowed by the Y High Clip and Y Low Clip and the total composite waveform stays within the range defined by Comp High Clip and Comp Low Clip.
The legaliser works by selectively reducing the saturation of pixels which would otherwise result in over modulation of the composite waveform. Composite mode preserves the hue of each pixel but not the saturation.

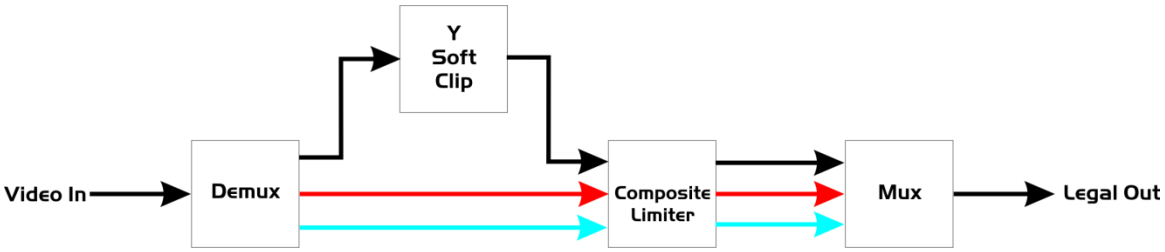


Figure 13: Composite Legaliser Structure

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Comp + RGB mode

The video signal is legalised as described in the **Composite legalisation** section, and then the legalised signal is passed through a second legaliser as specified in the **RGB legalisation** section.

Clip & Knee

Many of the legaliser functions present Clip and Knee parameters to the user. The Clip parameters specify the maximum and minimum values the system legaliser will allow to pass. **Figure 14** shows an illegal input to the clipper with detail in the illegal highlight and lowlight areas of the signal. When the knee values are set to the same value as their respective Clips the legaliser operates as a hard-clipper as shown in **Figure 15** show shows the now legal signal but the detail in the highlights and lowlights has been lost. **Figure 16** shows the same input signal legalised with a 10% difference between the Clips and their respective Knees. The highlight/lowlight detail has been compressed into the legal region at the expense of some of the dynamic range of the originally legal part of the waveform.

Figure 14: Illegal Source

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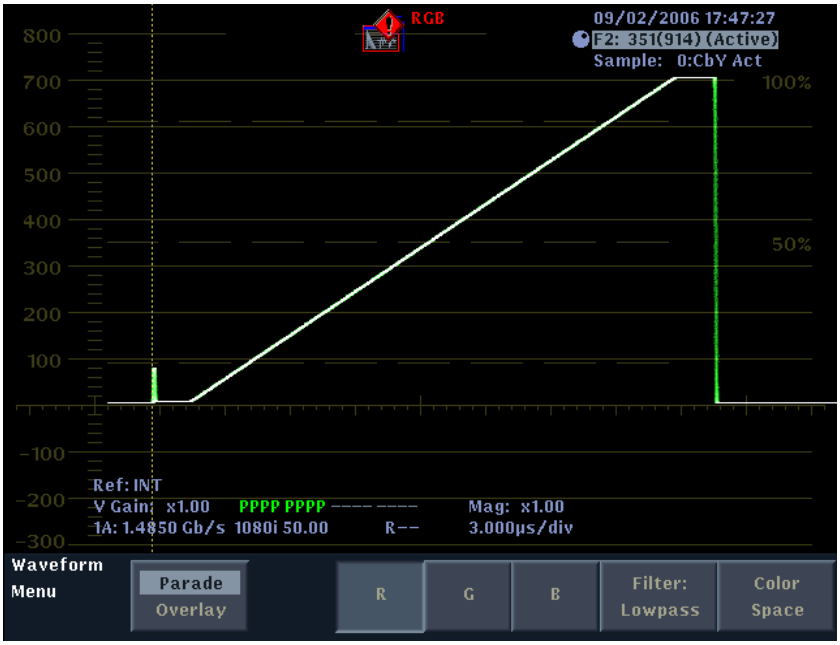

Figure 15: Hard Clipped Output

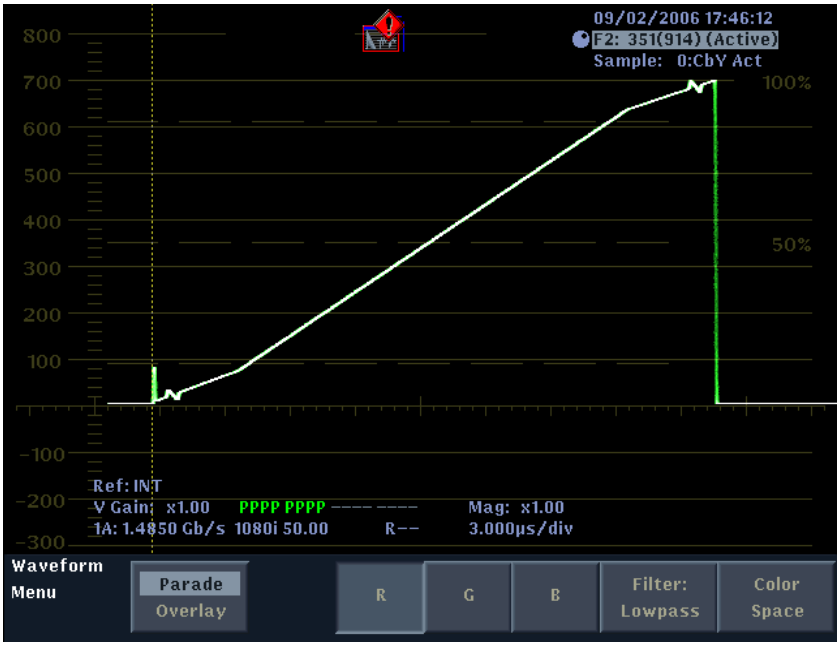

Figure 16: Soft Clipped Output

3.2.5 Proc Amp

Setting the proc amp values is done from the following menu, which is found under Setup→Lift/Gain:

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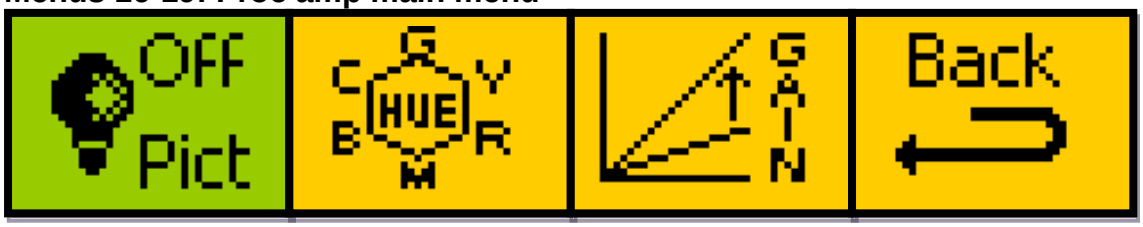
Menus 16-19: Proc amp main menu



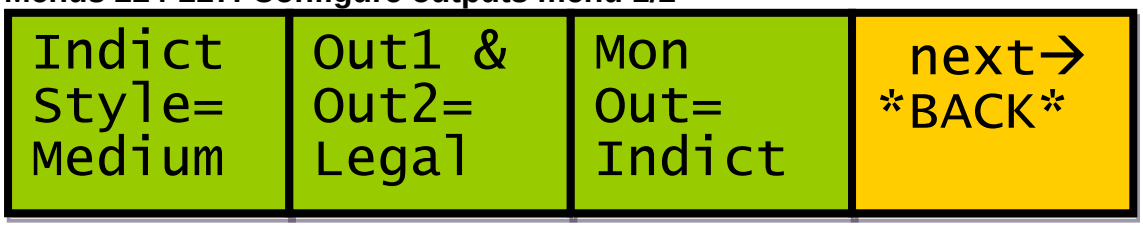
The proc amp enables the luma gain to be adjusted from 0 to 200%, Similarly the chroma also is adjustable from 0 to 200%. Full 10 bit by 10 bit multipliers are used with a rounded 10 bit product. Black level adjustment is also applied at this point as is hue adjustment which allows for ±180° of hue rotation.

3.2.6 Setting up the output video parameters

Either output of the **LE-2** can be configured as an indicate output, which allows the user to see which parts of the picture are being processed by the legaliser. The output config menu allows you to set the type of signal present at the output BNC's, and the output monitor menu allows the user to adjust the severity of the output indication. With the "Severe" setting the unit shows any out of gamut area which has been corrected by the legaliser with a sever zebra indication. In this mode you cannot tell how far out of gamut any particular part of the picture was. In "Medium" and "Light" modes, the severity of the zebra is dependent on how far out of gamut the signal was. The choice between "Light" and "Medium" is just a user preference. The "Medium" setting is more severe than the "Light" setting.

To set up the output video settings, navigate to Setup→NEXT→System→Monitor

Menus 224-227: Configure outputs menu 1/2



If using the LE-2 in dual-link mode (Dual Link units only), outputs 1 and 2 automatically set themselves to "Legal". The user can manually override these if desired.

The output modes can be set to the following:

- Legal – output is the legalised video stream
- Raw – output is the raw unaltered input video stream
- Indicate – output is the legalised video stream, but with the illegal parts of the video stream coloured according to how the output monitor menu is set up.

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3.2.7 Recalling settings when video standard is changed

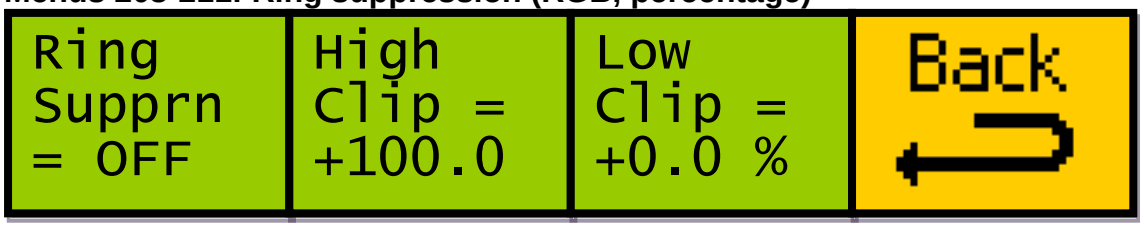
When the menu settings are changed the new values are automatically backed up to non-volatile memory. When the video standard is changed the previous settings for that standard are automatically restored.

3.3 Advanced features of the LE-2

3.3.1 Ring suppression

Ring suppression is controlled from the following menu, found by navigating to Setup→Comp→Ring Supprn:

Menus 208-211: Ring suppression (RGB, percentage)

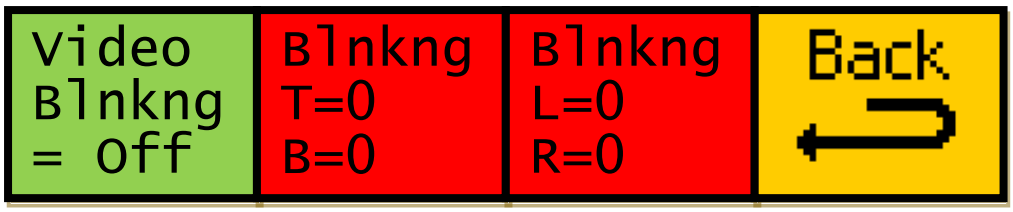


There are 3 different instances of this menu; one for RGB (in percent, as shown above), one for PAL (in mV) and one for NTSC (in IRE). The displayed menu will depend on the legalisation required, and the domain selected. Changes to the values within these menus are not copied across all three instances, so settings for PAL, NTSC and RGB are all stored separately.

Ring suppression can either be off, on or auto. In auto mode, the high and low settings for the current legalisation type are used as the high and low clip values for the ring suppression.

3.3.2 Adjusting the input picture blanking

Adjustment of the input picture blanking parameters uses the menu below, found under “Utils → Blank”



The blanking is defined as the number of pixels in from the edge of the input video picture that you want to be blanked off.

- T is the number of pixels of blanking from the top of the picture
- B is the number of pixels from the bottom of the picture
- L is the number of pixels from the left edge of the picture
- R is the number of pixels from the right edge of the picture

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- By default, all blanking variables are set to zero
- Video Blanking defaults to “Off”.

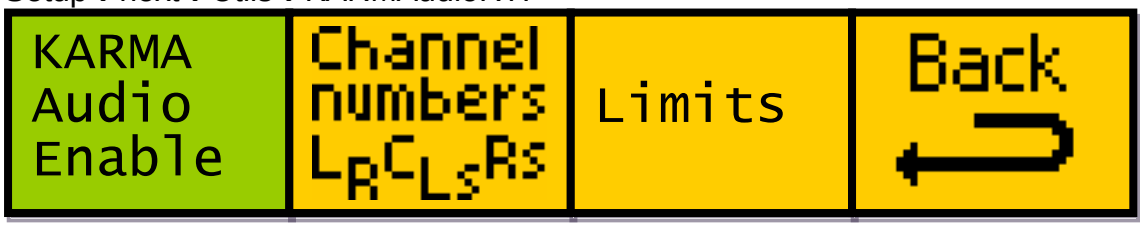
3.3.3 KARMAudioRT Loudness and true-peak control – these menus are only operational with the KARMAudioRT option (-K)

KARMAudioRT provides real-time automatic control of peak multi-channel embedded audio loudness as measured using then ITU-R BS.1770 multi-channel loudness algorithm. KARMAudioRT also provides real-time per-channel true-peak limiting as measured by the ITU-R BS.1770 true-peak estimation algorithm.

In order to control peak loudness KARMAudioRT continually calculates the multi-channel short-term loudness and compares this to the loudness limit. If the loudness limit is exceeded the audio gain for all channels selected for KARMAudioRT reduces at the rate set in the loudness attack menu until the short-term multi-channel loudness falls below the defined limit. While the short-term multi-channel loudness is below the defined limit the audio gain will increase, to a maximum of unity, at the rate defined by the loudness decay menu. KARMAudioRT will never apply a gain greater than unity to the audio.

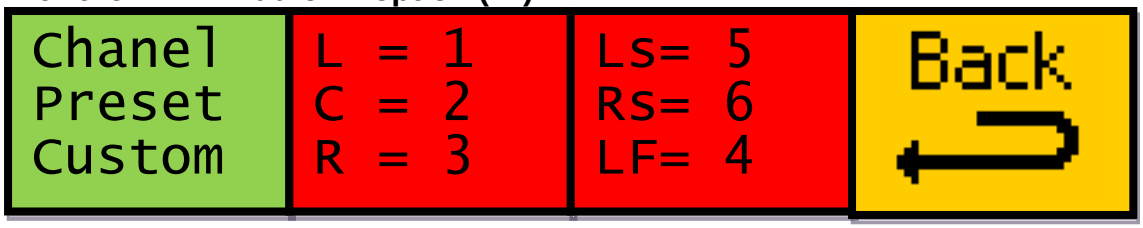
After the loudness control stage each audio channel is analyzed individually for true-peak limiting. Where the estimated true-peak value of a channel exceeds the Peak Knee value the source audio is adjusted according to the Clip and the Peak Compression to restrict the true-peak value to fall between the Peak Knee and Peak Clip values. By employing peak compression audio distortion is minimised.

KARMAudioRT is controlled from the following menus, found by navigating to Setup→next→Utils→KARMAudioRT:



The KARMAudio Enable button will toggle the KARMAudioRT audio processing on and off if the unit has the –K option. Operation of the KARMAudioRT is independant of the legaliser operation i.e. putting the legaliser into bypass will not bypass the KARMAudioRT processing. The KARMAudioRT settings are stored and recalled by the user memories.

Menus 244-247: KARMAudioRT Channels - this menu is only operational with the KARMAudioRT option (-K)



These menus select the embedded audio channel numbers (1 thru 16) that the KARMAudioRT loudness/peak processing is performed on. Press any red menu

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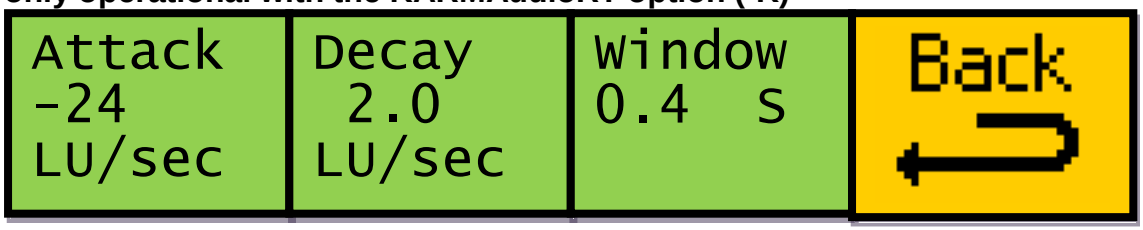
to access the individual parameters. The first menu facilitates quick selection of industry standard channel allocations. Adjusting any of the channel allocations will force the system to a “custom” channel allocation. Only the channels identified will be processed by the KARMAudioRT processing. Setting a channel to 0 will result it in being excluded from the KARMAudioRT calculations and processing.

Menus 176-179: KARMAudioRT Limits menu – this menu is only operational with the KARMAudioRT option (-K)

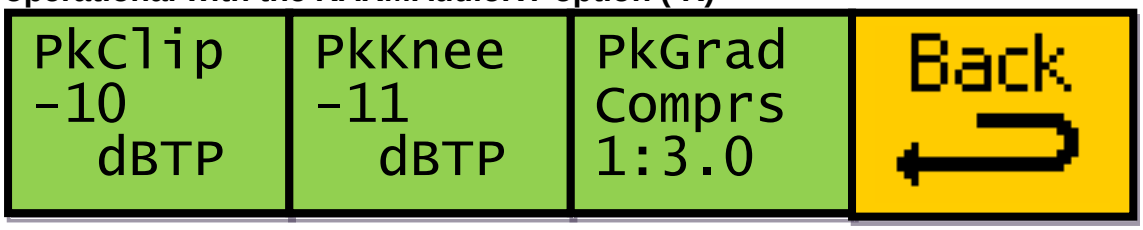
This menu sets the short-term loudness limit above which the audio gain will begin to reduce. The Loudness and Peak buttons provide access to more detailed loudness and peak processing parameters.

Menus 248-251: KARMAudioRT Loudness processing menu – this menu is only operational with the KARMAudioRT option (-K)



These menus allow configuration of the loudness processing parameters. The Attack parameter effects how rapidly the audio gain is reduced when the loudness limit is exceeded. The Decay parameter controls how quickly the audio gain recovers to unity after a loudness control event. The Window parameter controls the length of the short-term average used in the loudness calculation.

Menus 240-243: KARMAudioRT Peak processing menu – this menu is only operational with the KARMAudioRT option (-K)



These menus configure the peak processing parameters. Peak processing becomes active above the PKKnee level and all values between PKKnee and PKKnee + ((PKClip – PKKnee)/compression) are soft limited. Values above PKKnee + ((PKClip – PKKnee)/compression) are hard clipped. For the default values true-peak levels below -11 dBTP are unaffected, true-peak levels between -11dBTP and -8dBTP are soft limited and all true-peak levels above -8dBTP are hard limited.

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3.3.4 PC Logging Application

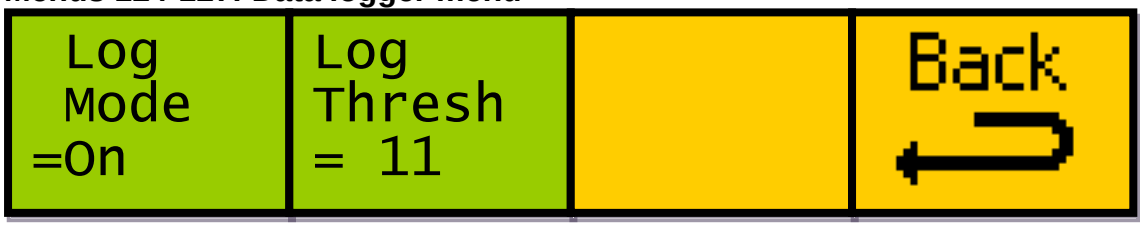
Installation

The latest version of the logging application can be downloaded from http://www.eyeheight.com/FileDownload.asp?filename=software\compliance\Composite_legaliser_TimeCode_utility.zip
The software requires the .NET Framework v1.1 to be installed on the PC to be used for logging. The .NET Framework can be downloaded free of charge from http://www.microsoft.com .
Extract all files in the Composite_legaliser_TimeCode_utility.zip file to a directory of your choice. Run the TimeCode.exe file to start the logger.

Setting Up for Logging

For successful logging the unit needs to be set to generate the logging output by setting the “Log Mode” menu to on.

Menus 124-127: Data logger menu



The unit then needs to be connected to a spare COM port on the PC (make a note of the com port number as it will be required when configuring the logging software) using a standard serial cable. Finally the com port needs to be configured in the logging software via the Comms menu.

Understanding the Application

The application provides a graphical log of the percentage of pixels in the incoming video which are considered to be illegal and the GUI can be seen in **Figure 17**. The application also provides a visual indication of illegal (green) and severely illegal (red) pixels where a pixel is considered to be severely illegal if it is more illegal than the gamut threshold. This enables the operator to isolate the dangerously illegal cases from those caused by minor variations between legaliser designs.

To start logging set up the COM port in the comms menu and then click start. The logging operation can be suspended by hitting the stop button. Where timecode is available to the unit in the format specified within the timecode menu of the **LE-2**, the application will log data against the timecode. If the timecode stops the log will also stop. If no timecode is present the application will log continually.
The received section gives details of the last log entry received whilst clicking on the graph window brings up the cursor and populates the cursor section with the log entry relating the selected bar. The zoom control allows viewing of a larger area of the log data.

Logs can be saved and opened at a later date using the file menu.

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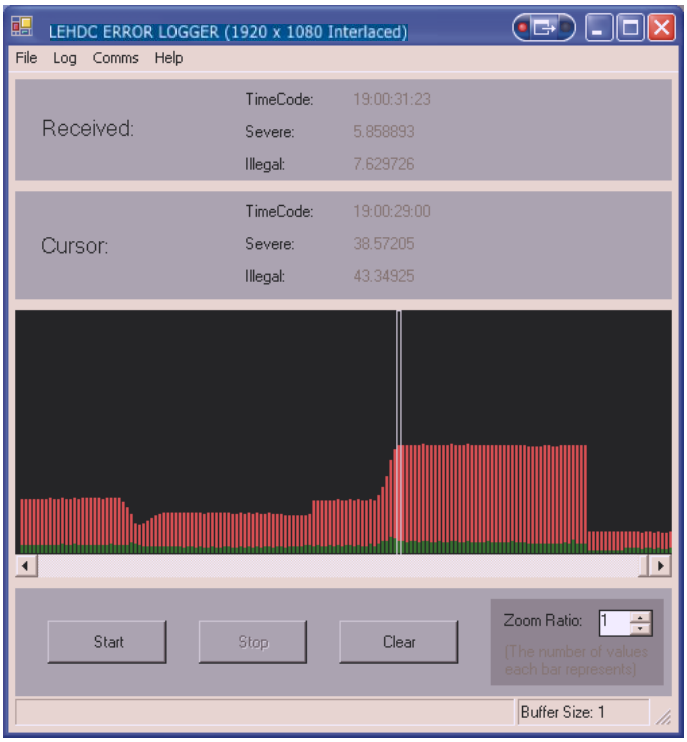


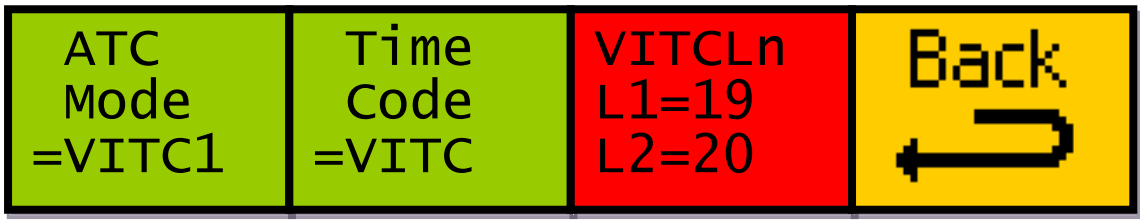
Figure 17: Logging Application GUI

3.3.5 Setting up timecode extraction

If timecode data is present in the input video, it can be extracted for use with the logging software to give a precise view of exactly where illegal video is.

Setup of the timecode extraction is done from the below menu, found under Setup→Utils→T.Codes:

Menus 128-131: Time code menu



To set up timecode extraction, select the timecode type from VITC, LTC or ATC and if necessary, select the ATC mode or VITC line numbers to further specify where the timecode data should be extracted from.

When this data is specified correctly, the next time the logging application is used it will log the legaliser data with timecode data.

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3.4 Memories

3.4.1 Power on memory

On power up, this product will automatically load the settings it had the last time it had power.

3.4.2 Preset memories

There are 6 preset memories, which set the unit up with some common settings. These are outlined below:

PAL normal:

- Legalisation method to ‘Comp’
- Ring suppression off
- Comp Y high clip and knee to 700mV
- Comp Y low clip and knee to 0mV
- Comp C high clip and knee to 930mV
- Comp C low clip and knee to -230mV
- Comp domain to PAL

NTSC normal:

- Legalisation method to ‘Comp’
- Ring suppression off
- Comp Y high clip and knee to 100.0 IRE
- Comp Y low clip and knee to 0.0 IRE
- Comp C high clip and knee to 120.0 IRE
- Comp C low clip and knee to -33.0 IRE
- Comp domain to NTSC 7.5 IRE

Bypass All:

- Legalisation method to ‘off’
- Ring suppression off

0-100% RGB:

- Legalisation method to ‘RGB’
- RGB high clip and knee to 100.0%
- RGB low clip and knee to 0.0%
- Ring suppression off

EBU103 Tight:

- Legalisation method to ‘RGB’
- RGB high clip and knee to 103.0%
- RGB low clip and knee to -1.0%
- Ring suppression off

EBU103 Normal:

- Legalisation method to ‘RGB’

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- RGB high clip and knee to 101.0%
- RGB low clip and knee to 0.0%
- Ring suppression off

Please note that no settings other than those listed above are changed when loading these presets.

3.4.3 User Memories

The user memories are a generic feature of all eyeheight geNETics products. The **LE-2** has six presets for common legalisation standards and six user memories, which are initially named, ‘user Mem 1’ through to ‘user mem 6’.

To save to a user memory, set up the unit as required and navigate to Setup→ System→Mems→USER Preset, then save the settings from either of the menus shown below:

Menus 168-171: User memories menu 3/4

user mem 1 Save	user mem 2 Save	user mem 3 Save	next→ *BACK* prev→

Menus 172-175: User memories menu 4/4

user mem 4 Save	user mem 5 Save	user mem 6 Save	*BACK* prev→

To show this memory as the loaded memory you will need to immediately load it once it’s saved, using the appropriate ‘user mem recall’ button.

3.4.4 Naming User Memories

The user memories can be named with up to 12 characters. To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. (See Figure 6: **LE-2S or LE-2M** connections for connector location). To name memory 1, “625v1 050309”

1. Hit F9 function key. The LCD displays will change to text entry mode.
2. Type “M01: 625v1 ” and then press enter.
3. Type “M02: 050309” and then press enter.
4. You may get a “not acknowledged” message from either of the above; this does not matter.

Other memories can be named in the same way but changing the 01 and 02 to other numbers (for user memory 2 use 03 and 04, for mem 3 use 05 and 06, etc.).

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3.5 Tamper Locking the LE-2

The user can lock specific menus or all the menus on the **LE-2** so that it cannot be adjusted with a manual control panel. This does not effect automation.
To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. (See Figure 8: Flexipanel (FP-9) controls. for connector location). To lock only menu 5:

1. Hit F9 function key. The LCD displays will change to text entry mode
2. Type “L05:” and then press enter.

A padlock symbol will appear on the menu and it cannot be adjusted. To unlock menu 5, type “A05:” as step 2 above. Other menus are done in the same way
To lock the whole product type “L:” as step 2 above and to unlock the whole product type “A:” as step 2 above.

3.5.1 Globally locking the user menus

Hold in the DEVICE SELECT button to which the LE-2 is assigned until a message is displayed on the menus informing you that “User has LOCKED menus” or “User has UNLOCKED menus”.

3.6 GPI/Tally Set-up

3.6.1 On-Board GPI’s

The **LE-2** is a geNETics product. The geNETics system uses generic Input/Output cards which have 2 GPI’s. These GPI’s activate the first 2 user memories in the system.

GPI 1 - Activate User Memory 1
GPI 2 - Activate User Memory 2

Activate = Short to ground or logic 0V. See Appendix.

3.6.2 Configuring tallies on the etherbox

The **LE-2** can use an etherbox tally to indicate that it is is bypass (no processing) mode
The etherbox chassis has three usable tallies. These are Tallies 11, 12 and 13. Set up menu 121 for the box number and tally number that you wish to use. If you do not wish to use a tally set the box number to 0. Refer to the etherbox manual for interface information.

3.7 Resetting the LE-2

There are 2 types of resets available which don’t involve removing the **LE-2** from the chassis. Both of these are available from the following menu, navigated to via Setup→System→Resets:

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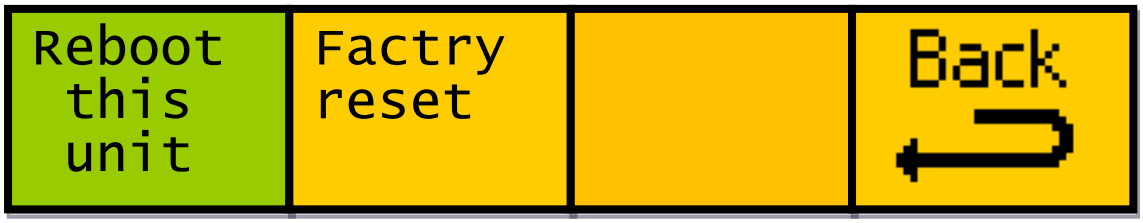
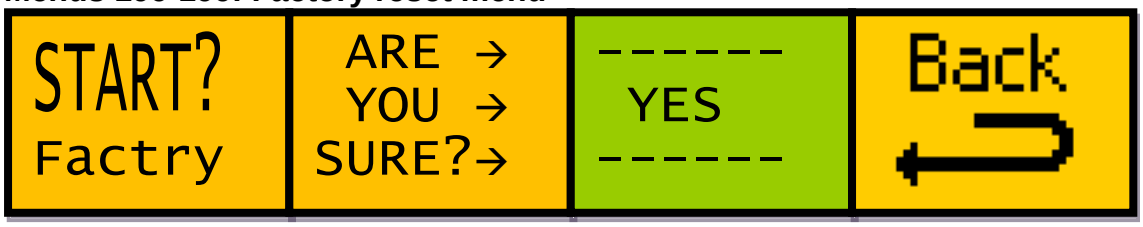
Menus 188-191: Resets menu



The ‘reboot this unit’ option will have the same effect as removing power to the LE-2, without having to have physical access to the unit. If the unit exhibits unusual behaviour, this is a good action to take and may correct the problem. It is likely, however, that output video will be slightly interrupted as the unit resets, so doing this while on-air is not recommended.

The ‘factory reset’ option will display the following menu:

Menus 196-199: Factory reset menu

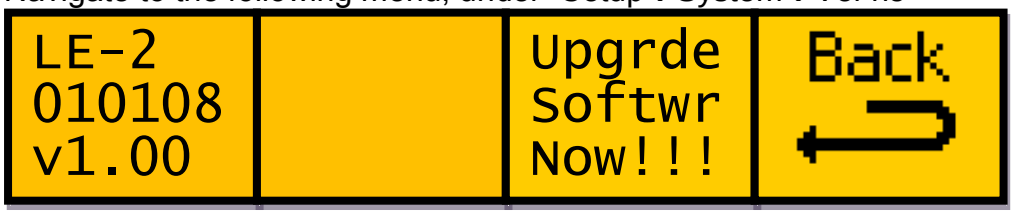


Pressing “YES” will restore all the factory default settings and will clear all the memories.

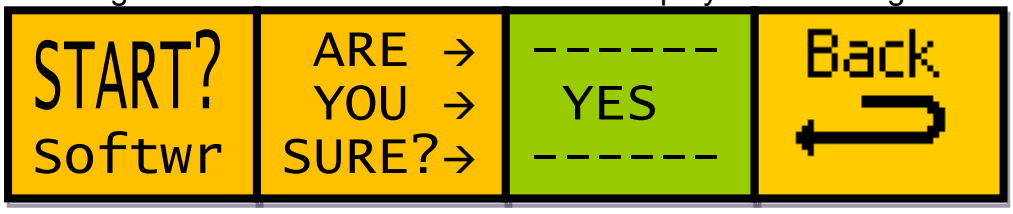
WARNING! Performing a factory reset will permanently erase all user memories that have been stored, as well as erasing the current power-on default setting.

3.8 Software upgrade

Navigate to the following menu, under “Setup→System→Ver’ns”



Pressing “UPGRDE SOFTWR NOW!!!” will display the following set of menus



Pressing “YES” will display the following set of menus

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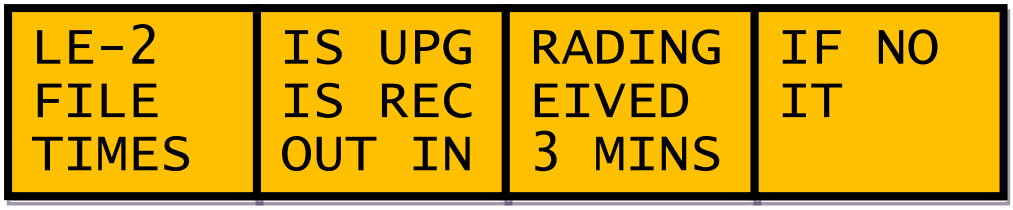

The unit will be set into the state where it can be field upgraded using the "Flasher" software which can be downloaded from our web site: www.eyeheight.com

3.9 Dual Link Mode

In dual link mode the LE-2 automatically detects the SMPTE 352 packet in the "A" link. This packet is essential for the correct operation in dual link mode and is obligatory for any dual link system. Without it the unit will not switch into dual link operation.

If the correct SMPTE 352 packet is detected the unit will configure itself for the incoming standard. The unit will handle 4:4:4 RGB and YCbCr modes in 10 and 12 bit.

There are no manual menu settings for dual link mode. All legaliser settings are available and KarmAudio works with audio on the "A" link. It is not configurable for audio on the "B" link.

PLEASE NOTE:

Due to the internal configuration of the legaliser it was not possible to enable the operation of the proc amp in dual link RGB modes. It does however operate in dual link Y Cb Cr modes.

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4 The LE-2 Menu Set

The following set of menus defines the operational controls of the **LE-2**.
Note: Only parameters with **RED** menu numbers are stored in the memories, and are also saved automatically as soon as they are changed.

Menus 00-03: Top Level Menus

Menu Num.	Heading	Function
0	Audio Levelling Mode	Audio Bypass – No audio processing is done Audio Lim 1770-15ML – This applies “Momentary” mode (0.4S window) audio loudness correction to -15LKFS. This is a suggested value from the PLOUD committee for material which cannot be corrected by the full 1770-1 or 1770-2 specification. Using this will result in a fast responsive loudness correction than the 1770-20SL. Corrective gain changes will be more frequent. Audio Lim 1770-20SL – This applies “Short Term” mode (3.0S window) audio loudness correction to -20LKFS. This is a suggested value from the PLOUD committee for material which cannot be corrected by the full 1770-1 or 1770-2 specification. Using this will result in a slower response loudness correction than the 1770-15ML. Corrective gain changes will be less frequent. Audio Lim User Def – This takes the settings that the user sets and leaves from the KarmAudio setup menus whilst in this mode.

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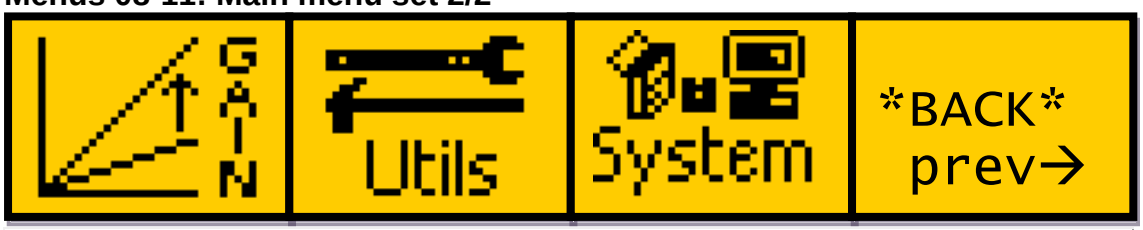
1	Legaliser mode	This menu selects the required legalisation mode between off, RGB, YCC, comp or comp & RGB.
2	Memories	Pressing this takes you to the Preset and user memories. (Go To Menus 148-151)
3	Setup	Pressing this will take you to the first of the nested setup menus (Go To **Menus 04-07**)

Menus 04-07: Main menu set 1/2

Menu Num.	Heading	Function
4	RGB/YCC legal menu	Pressing this button takes you to the RGB and YCC legalisation settings menus (Go To **Menus 28-31**)
5	Composite legal menu	Pressing this button takes you to the Composite legalisation settings menu, which includes the ring suppression (Go To **Menus 100-103**)
6	KARMAudioRT audio processing settings	Pressing the button takes you to the KARMAudioRT setup menu (Go To **Menus 12-15**) **–** these menus are only operational with the KARMAudioRT option (-K)
7	Back	Pressing this button takes you to the previous level of menus (Go To **Menus 00-03**) Pressing the **next** button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 08-11**)

Menus 08-11: Main menu set 2/2



Menu Num.	Heading	Function

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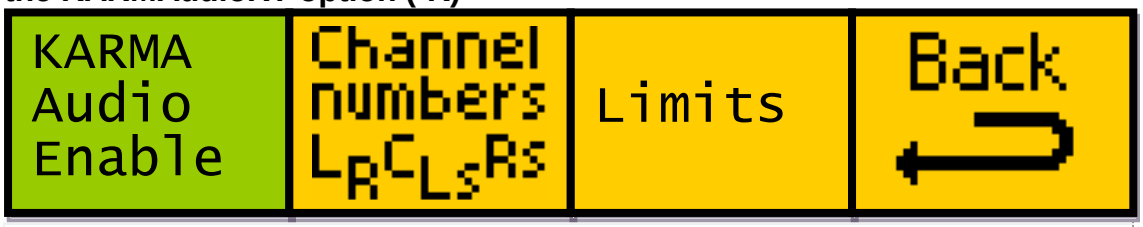
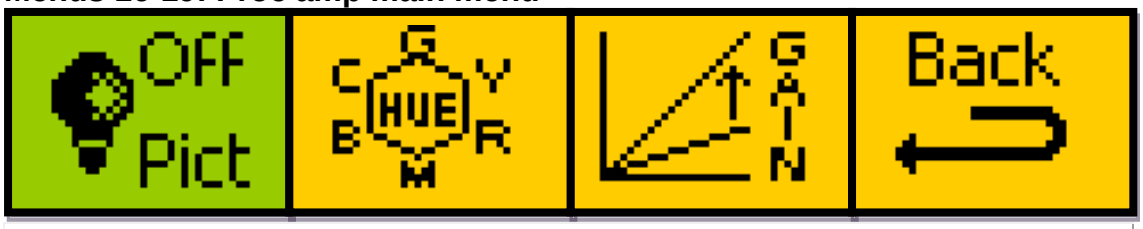
8	Proc amp menu	Pressing this button takes you to the Proc amp settings menu (Go To **Menus 16-19**)
9	Utilities menu	Pressing this button takes you to the utilities menu (Go To **Menus 120-123**)
10	System menu	Pressing this button takes you to the system menu (Go To **Menus 180-183**)
11	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 00-03**) Pressing the **prev** button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 04-07**)

Menus 12-15: KARMAudioRT menus – this menu is only operational with the KARMAudioRT option (-K)



Menu Num.	Heading	Function
12	KARMAudioRT status	Pressing this button Enables/Disables all KARMAudioRT processing.
13	Loudness Channels menu	Pressing the button takes you to the Peak Loudness menu (Go To **Menus 244-247**)
14	Limits menu	Pressing the button takes you to the Limits menu (Go To **Menus 176-179**)
15	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**)

Menus 16-19: Proc amp main menu



Menu Num.	Heading	Function

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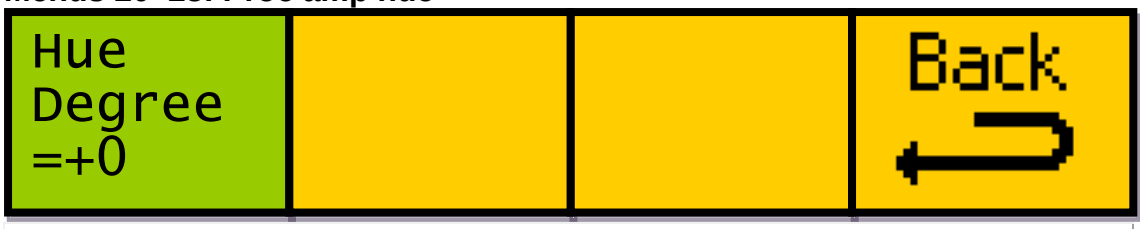
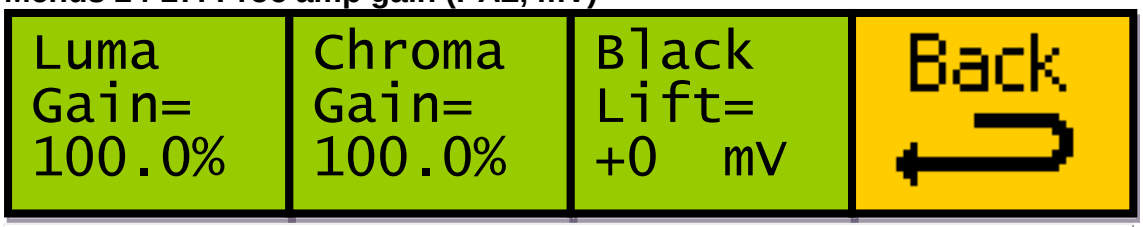
16	Proc amp status	Pressing this button turns on or off the proc amp.
17	Hue menu	Pressing this button takes you to the hue menus (Go To **Menus 20–23**)
18	Gain menu	Pressing this button takes you to the gain menus (Go To **Menus 24-27**)
19	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**)

Menus 20–23: Proc amp hue



Menu Num.	Heading	Function
20	Hue adjustment	This button sets the value of the hue adjustment, with a range of -180 to +180 degrees.
21	---	---
22	---	---
23	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 16-19**)

Menus 24-27: Proc amp gain (PAL, mV)



Menu Num.	Heading	Function
24	Luma gain adjustment	This menu adjusts the luma gain between 0% and 200%.
25	Chroma gain adjustment	This menu adjusts the chroma gain between 0% and 200%.
26	Black lift	This menu adjusts the black lift between -200mV and +200mV.
27	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 16-19**)

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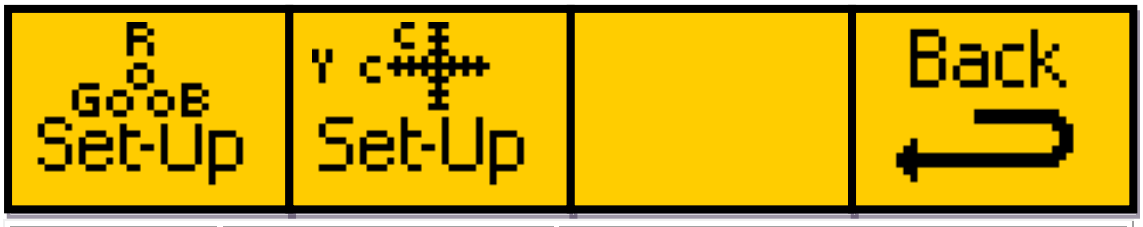
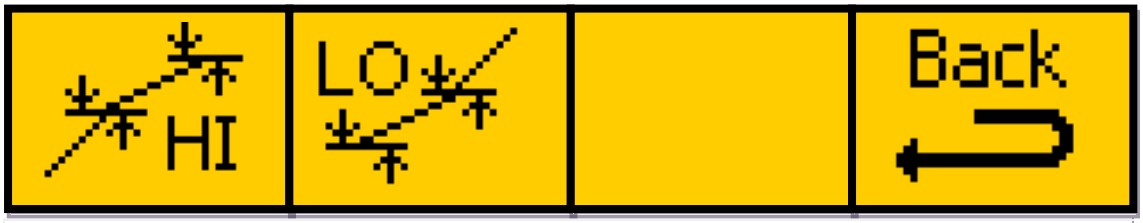
Menus 28-31: RGB/YCC main menu



Menu Num.	Heading	Function
28	RGB setup	Pressing the button takes you to the RGB legalisation menu (Go To **Menus 32-35**)
29	YCC setup	Pressing the button takes you to the YCC legalisation menu (Go To **Menus 44-47**)
30	---	---
31	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**)

Menus 32-35: RGB hi/lo menu



Menu Num.	Heading	Function
32	RGB high clip and knee setup	Pressing the button takes you to the RGB high clip and knee adjustment menu (Go To **Menus 36-39**)
33	RGB low clip and knee setup	Pressing the button takes you to the RGB low clip and knee adjustment menu (Go To **Menus 40-43**)
34	---	---
35	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 28-31**)

Menus 36-39: RGB high clip and knee

Menu Num.	Heading	Function
36	RGB high clip	This menu adjusts the high RGB clip

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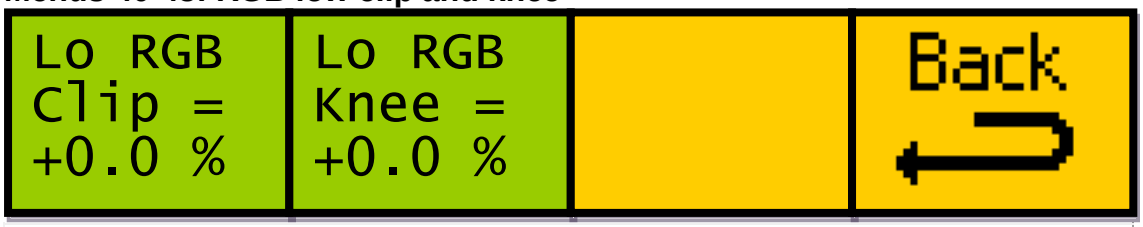
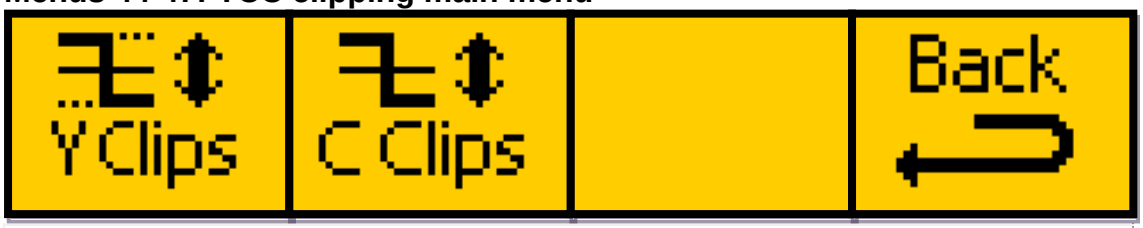
		value. Values are in percent.
37	RGB high knee	This menu adjusts the high RGB knee value. Values are in percent.
38	---	---
39	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 32-35**)

Menus 40-43: RGB low clip and knee



Menu Num.	Heading	Function
40	RGB low clip	This menu adjusts the low RGB clip value. Values are in percent.
41	RGB low knee	This menu adjusts the low RGB knee value. Values are in percent.
42	---	---
43	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 32-35**)

Menus 44-47: YCC clipping main menu



Menu Num.	Heading	Function
44	YCC luma setup	Pressing the button takes you to the YCC luma menu (Go To **Menus 48-51**)
45	YCC chroma setup	Pressing the button takes you to the YCC chroma menu (Go To **Menus 60-63**)
46	---	---
47	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 28-31**)

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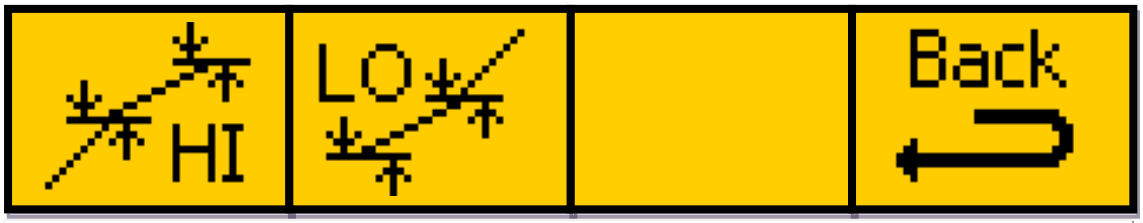
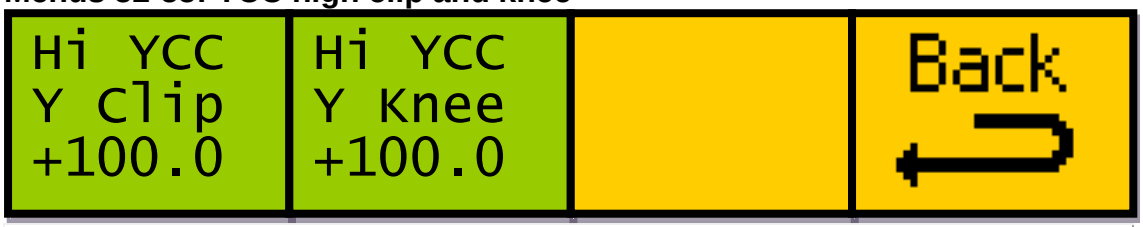
Menus 48-51: YCC Y hi/lo menu



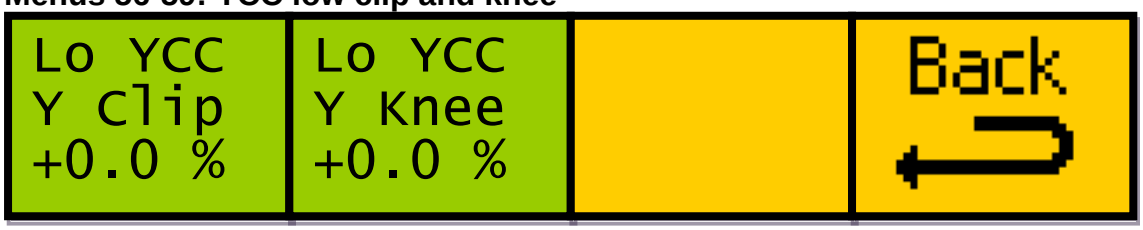
Menu Num.	Heading	Function
48	YCC luma high clip and knee setup	Pressing the button takes you to the YCC luma high clip and knee adjustment menu (Go To **Menus 52-55**)
49	YCC luma low clip and knee setup	Pressing the button takes you to the YCC luma low clip and knee adjustment menu (Go To **Menus 56-59**)
50	---	---
51	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 44-47**)

Menus 52-55: YCC high clip and knee



Menu Num.	Heading	Function
52	YCC Y high clip	This menu adjusts the high YCC luma clip value. Values are in percent.
53	YCC Y high knee	This menu adjusts the high YCC luma knee value. Values are in percent.
54	---	---
55	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 48-51**)

Menus 56-59: YCC low clip and knee



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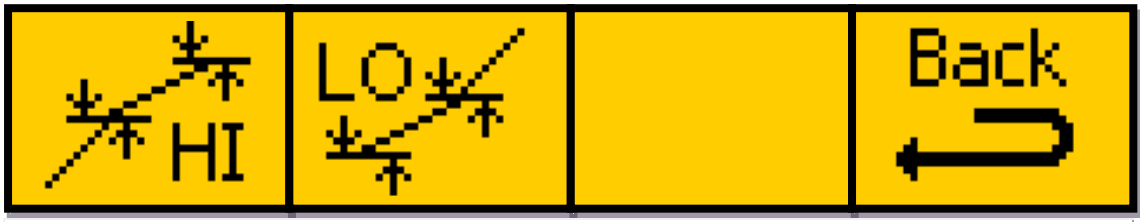
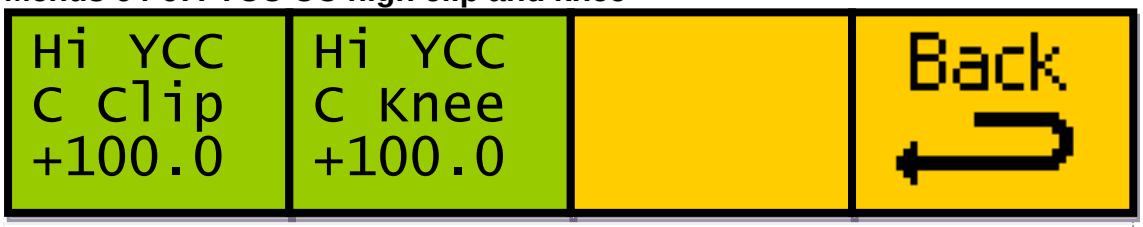
Menu Num.	Heading	Function
56	YCC Y low clip	This menu adjusts the low YCC luma clip value. Values are in percent.
57	YCC Y low knee	This menu adjusts the low YCC luma knee value. Values are in percent.
58	---	---
59	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 48-51**)

Menus 60-63: YCC CC hi/lo menu



Menu Num.	Heading	Function
60	YCC chroma high clip and knee setup	Pressing the button takes you to the YCC chroma high clip and knee adjustment menu (Go To **Menus 64-67**)
61	YCC chroma low clip and knee setup	Pressing the button takes you to the YCC chroma low clip and knee adjustment menu (Go To **Menus 68-71**)
62	---	---
63	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 44-47**)

Menus 64-67: YCC CC high clip and knee



Menu Num.	Heading	Function
64	YCC C high clip	This menu adjusts the high YCC chroma clip value. Values are in percent.
65	YCC C high knee	This menu adjusts the high YCC chroma knee value. Values are in percent.
66	---	---

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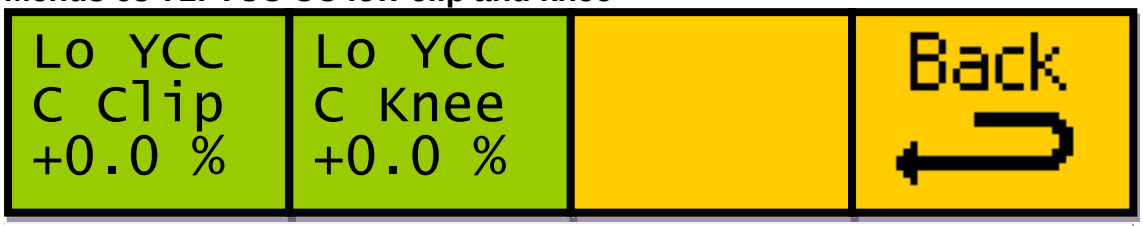
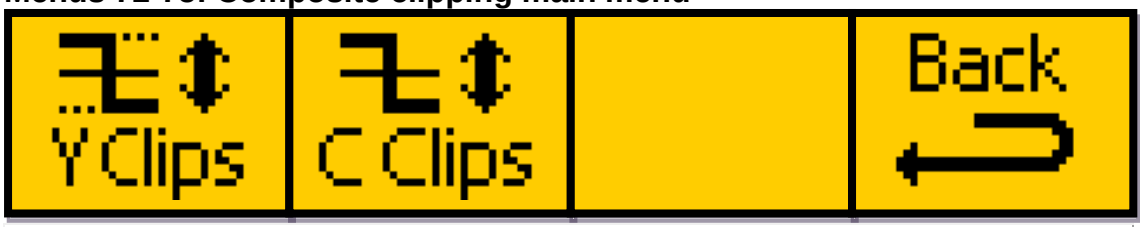
67	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 60-63**)

Menus 68-71: YCC CC low clip and knee



Menu Num.	Heading	Function
68	YCC C low clip	This menu adjusts the low YCC chroma clip value. Values are in percent.
69	YCC C low knee	This menu adjusts the low YCC chroma knee value. Values are in percent.
70	---	---
71	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 60-63**)

Menus 72-75: Composite clipping main menu



Menu Num.	Heading	Function
72	Component luma setup	Pressing the button takes you to the Component luma menu (Go To **Menus 76-79**)
73	Component chroma setup	Pressing the button takes you to the Component chroma menu (Go To **Menus 88-91**)
74	---	---
75	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**)

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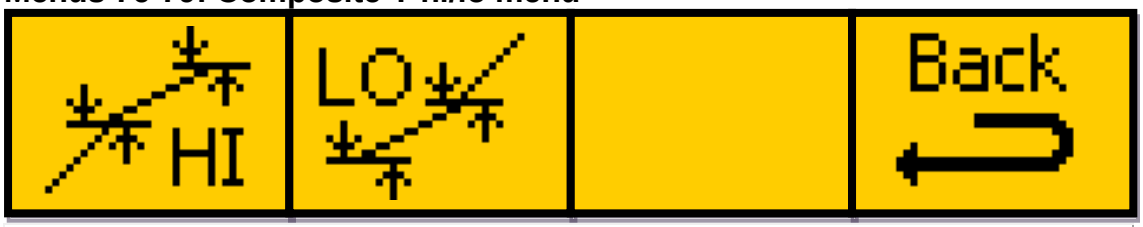
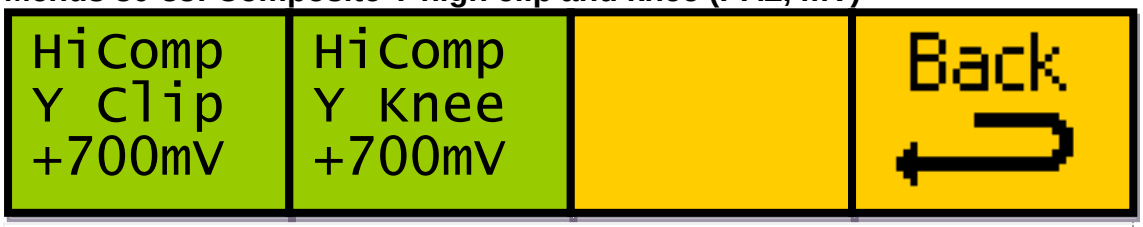
Menus 76-79: Composite Y hi/lo menu



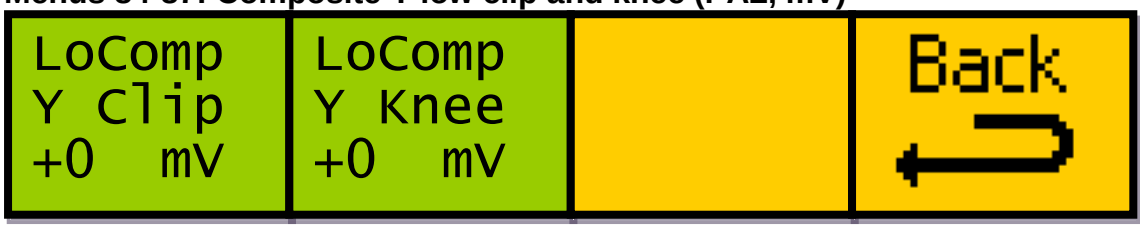
Menu Num.	Heading	Function
76	Comp luma high clip and knee setup	Pressing the button takes you to the Comp luma high clip and knee adjustment menu (Go To **Menus 80-83**)
77	Comp luma low clip and knee setup	Pressing the button takes you to the Comp luma low clip and knee adjustment menu (Go To **Menus 84-87**)
78	---	---
79	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 72-75**)

Menus 80-83: Composite Y high clip and knee (PAL, mV)



Menu Num.	Heading	Function
80	Comp Y high clip	This menu adjusts the high Comp luma clip value. Values are in mV.
81	Comp Y high knee	This menu adjusts the high Comp luma clip knee value. Values are in mV.
82	---	---
83	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**)

Menus 84-87: Composite Y low clip and knee (PAL, mV)



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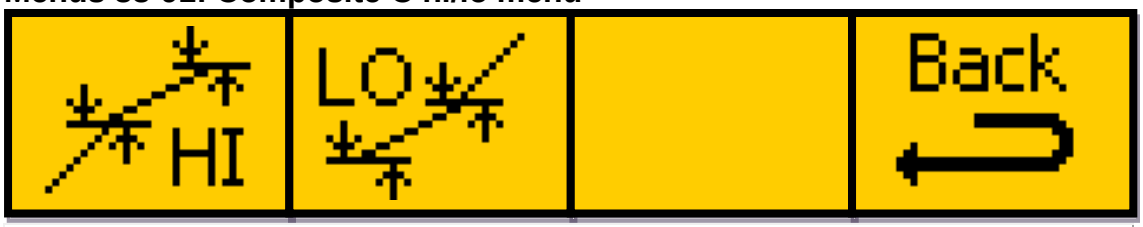
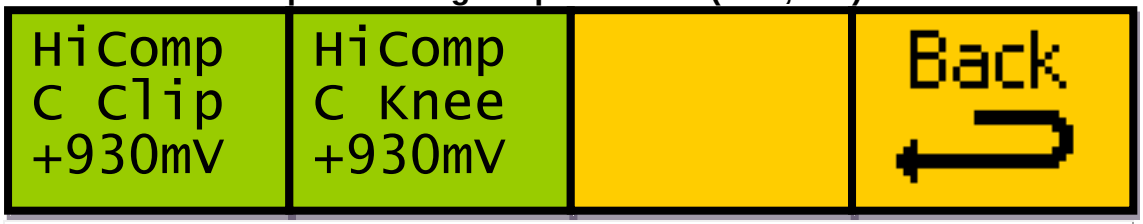
Menu Num.	Heading	Function
	Comp Y low clip	This menu adjusts the low Comp luma clip value. Values are in mV.
	Comp Y low knee	This menu adjusts the low Comp luma clip knee value. Values are in mV.
	---	---
	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**)

Menus 88-91: Composite C hi/lo menu



Menu Num.	Heading	Function
88	Comp composite high clip and knee setup	Pressing the button takes you to the Comp composite high clip and knee adjustment menu (Go To **Menus 92-95**)
89	Comp composite low clip and knee setup	Pressing the button takes you to the Comp composite low clip and knee adjustment menu (Go To **Menus 96-99**)
90	---	---
91	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 72-75**)

Menus 92-95: Composite C high clip and knee (PAL, mV)



Menu Num.	Heading	Function
92	Comp C high clip	This menu adjusts the high Comp component clip value. Values are in mV.
93	Comp C high knee	This menu adjusts the high Comp component clip knee value. Values are in mV.

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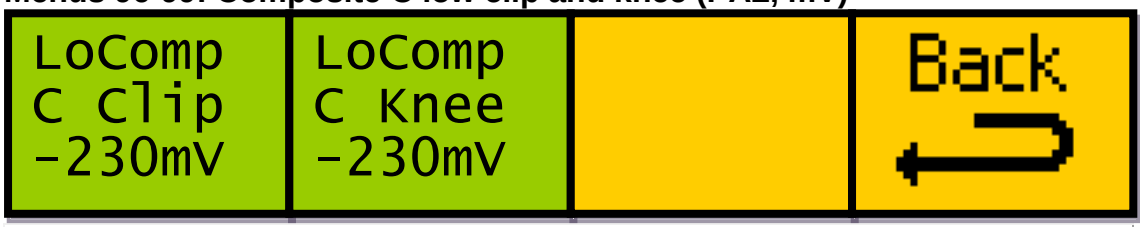
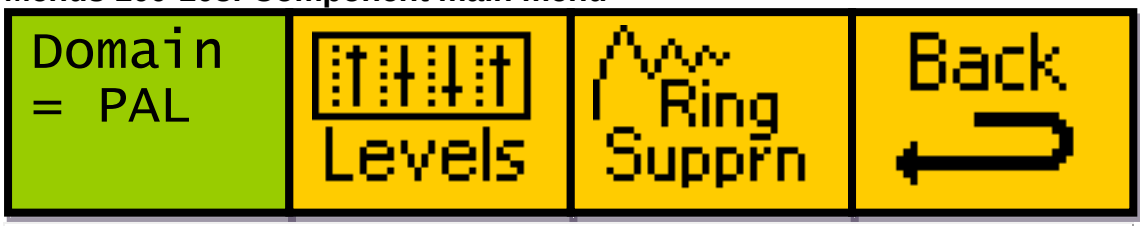
94	---	---
95	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**)

Menus 96-99: Composite C low clip and knee (PAL, mV)



Menu Num.	Heading	Function
96	Comp C low clip	This menu adjusts the low Comp component clip value. Values are in mV.
97	Comp C low knee	This menu adjusts the low Comp component clip knee value. Values are in mV.
98	---	---
99	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**)

Menus 100-103: Component main menu



Menu Num.	Heading	Function
100	Legaliser domain	This menu sets the domain used by the legaliser. For more information Go To **3.2.3**
101	Comp setup	Pressing the button takes you to the Comp settings menu (Go To **Menus 72-75**)
102	Ring suppression setup	Pressing the button takes you to the ring suppression settings menu (Go To **Menus 208-211**)
103	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**)

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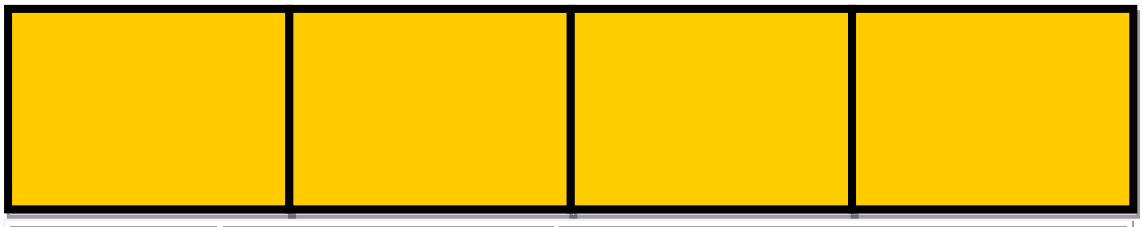
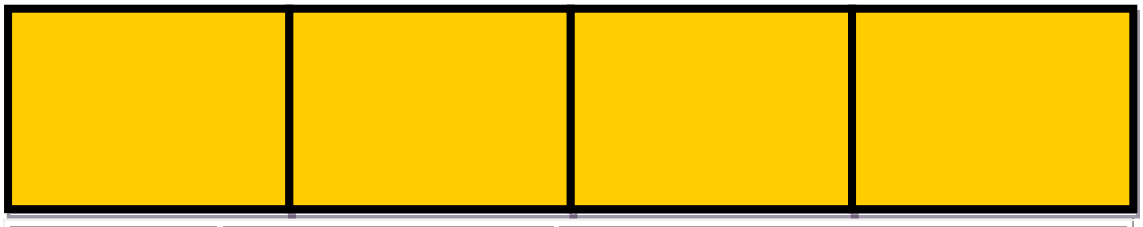
Menus 104-107: Not used



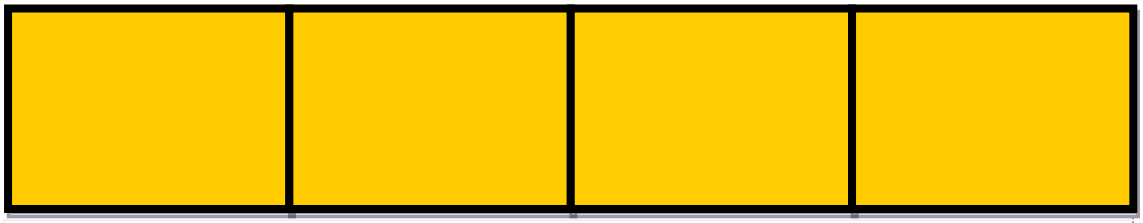
Menu Num.	Heading	Function
104	Not used	
105	Not used	
106	Not used	
107	Not used	

Menus 108-111: Not used



Menu Num.	Heading	Function
108	Not used	
109	Not used	
110	Not used	
111	Not used	

Menus 112-115: Not used



Menu Num.	Heading	Function
112	Not used	
113	Not used	
114	Not used	
115	Not used	

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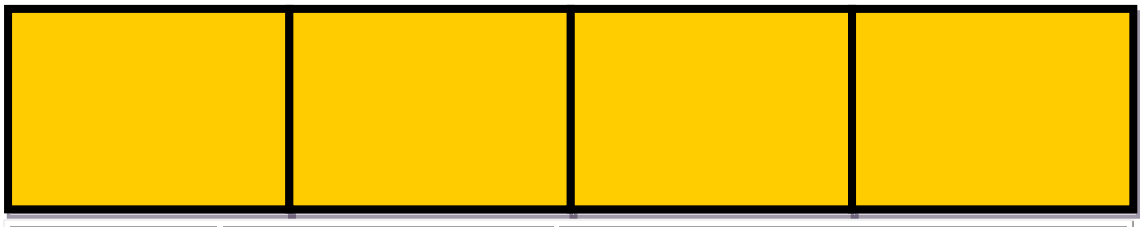
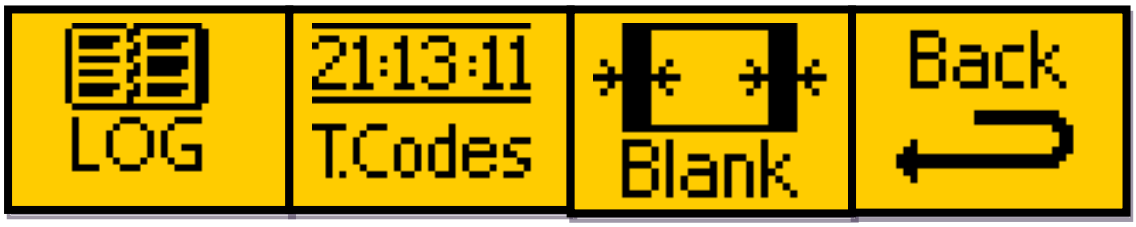
Menus 116-119: Not used



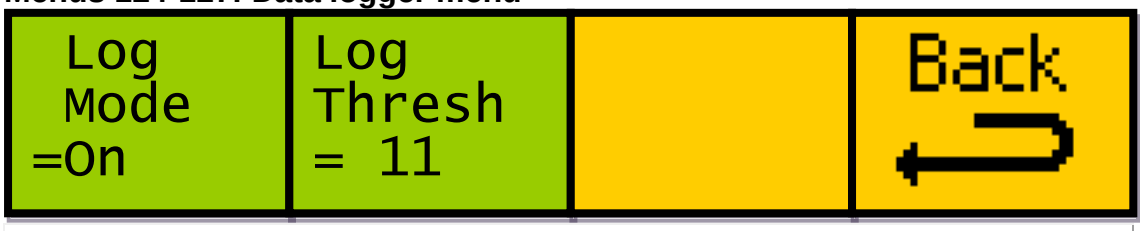
Menu Num.	Heading	Function
116	Not used	
117	Not used	
118	Not used	
119	Not used	

Menus 120-123: Utilities menu



Menu Num.	Heading	Function
120	Log mode settings	Pressing the button takes you to the logging setup menu (Go To **Menus 124-127**)
121	Time code settings	Pressing the button takes you to the time code setup menu (Go To **Menus 128-131**)
122	Blanking settings	Pressing the button takes you to the blanking setup menu (Go To **Menus 232-235**)
123	Back	Return to menu

Menus 124-127: Data logger menu



Menu Num.	Heading	Function
124	Log mode enable	This menu enables or disables logging mode. For more information on the logging

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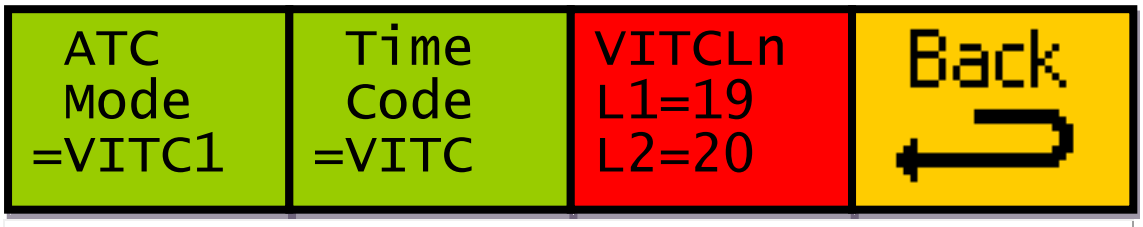
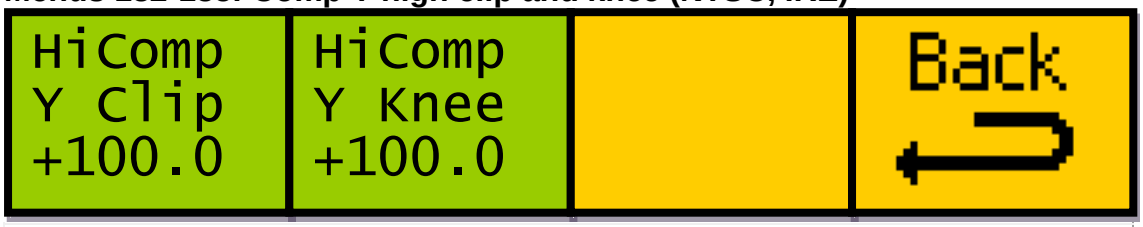
		function of the **LE-2**, Go To **Error! eference source not found.**
125	Log threshold	This menu sets the level at which an illegal pixel is considered a severe failure.
126	---	---
127	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**)

Menus 128-131: Time code menu



Menu Num.	Heading	Function
128	ATC mode	This menu sets the Ancillary time code mode between LTC, VITC1 and VITC2. For more information on the time code function Go To **3.3.5**
129	Time code mode	This menu sets the time code mode to VITC, LTC or ATC.
130	VITC line numbers	This menu sets the VITC line numbers.
131	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**)

Menus 132-135: Comp Y high clip and knee (NTSC, IRE)



Menu Num.	Heading	Function
132	Comp Y high clip	This menu adjusts the high Comp luma clip value. Values are in IRE.
133	Comp Y high knee	This menu adjusts the high Comp luma clip knee value. Values are in IRE.
134	---	---

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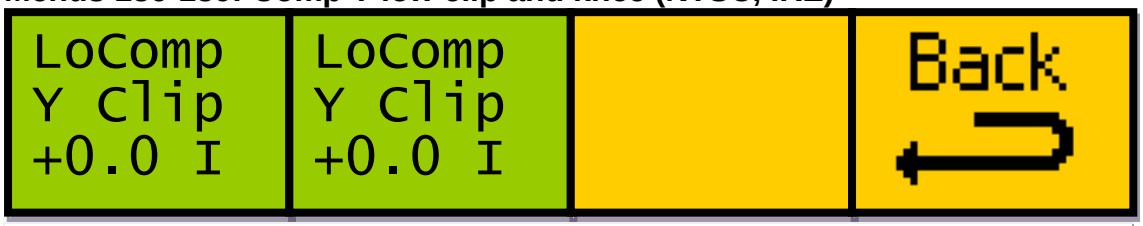
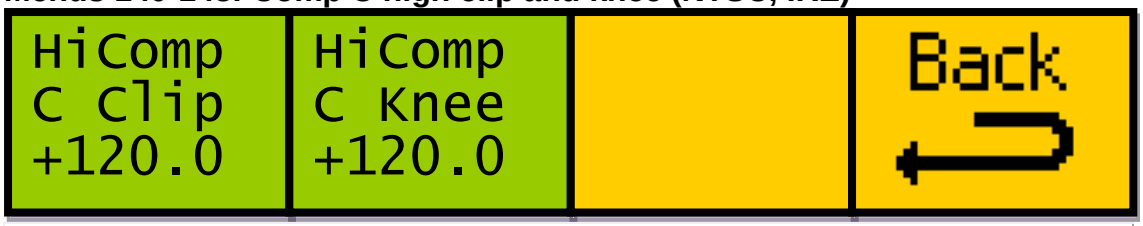
135	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**)

Menus 136-139: Comp Y low clip and knee (NTSC, IRE)



Menu Num.	Heading	Function
136	Comp Y low clip	This menu adjusts the low Comp luma clip value. Values are in IRE.
137	Comp Y low knee	This menu adjusts the low Comp luma clip knee value. Values are in IRE.
138	---	---
139	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**)

Menus 140-143: Comp C high clip and knee (NTSC, IRE)



Menu Num.	Heading	Function
140	Comp C high clip	This menu adjusts the high Comp component clip value. Values are in IRE.
141	Comp C high knee	This menu adjusts the high Comp component clip knee value. Values are in IRE.
142	---	---
143	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**)

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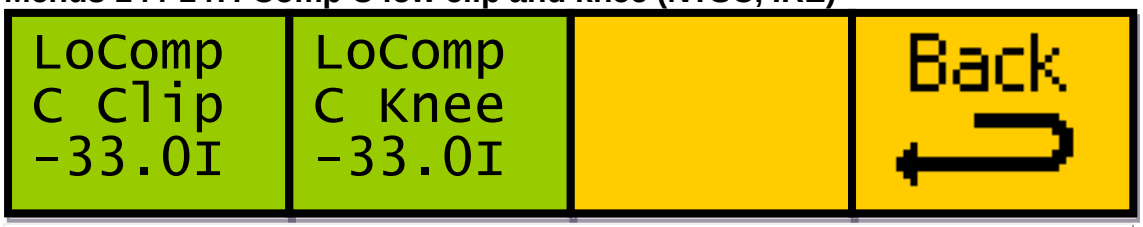
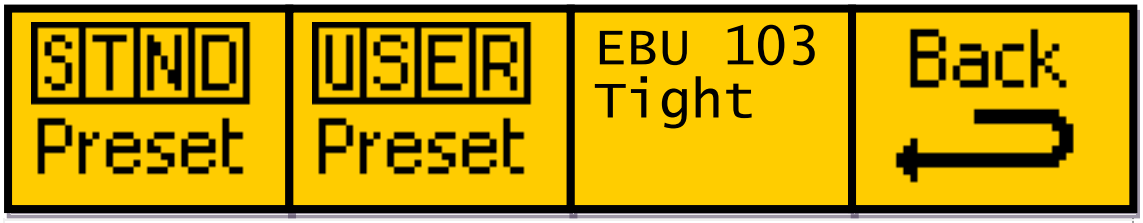
Menus 144-147: Comp C low clip and knee (NTSC, IRE)



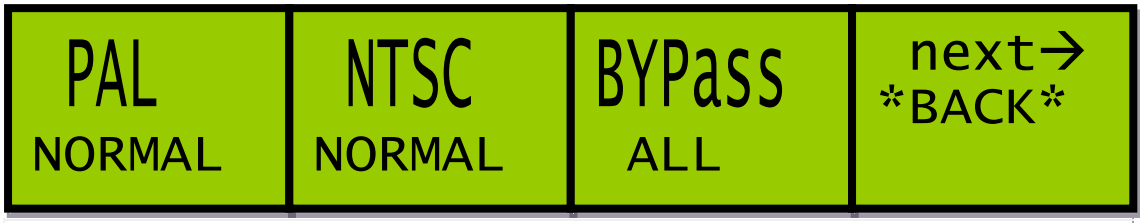
Menu Num.	Heading	Function
144	Comp C low clip	This menu adjusts the low Comp component clip value. Values are in IRE.
145	Comp C low knee	This menu adjusts the low Comp component clip knee value. Values are in IRE.
146	---	---
147	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**)

Menus 148-151: Memories menu



Menu Num.	Heading	Function
148	Preset memories	Pressing the button takes you to the preset memory loading menus (Go To **Menus 152-155**)
149	User memories	Pressing the button takes you to the user memory load and save menus (Go To **Menus 160-163**)
150	Current Preset	This shows the current Preset setting
151	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 00-03**)

Menus 152-155: Preset memories menu 1/2



Menu Num.	Heading	Function
152	Load preset 1	Pressing this button loads the 'PAL

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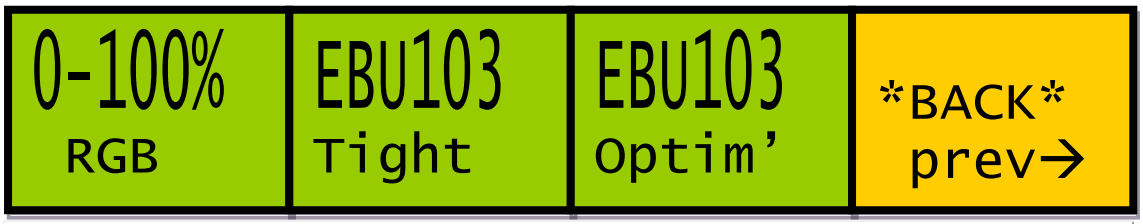
		normal' preset memory. For details on the preset memories, see section **3.4.2**
153	Load preset 2	Pressing this button loads the 'NTSC normal' preset memory.
154	Load preset 3	Pressing this button loads the 'Bypass all' preset memory.
155	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 156-159**)

Menus 156-159: Preset memories menu 2/2



Menu Num.	Heading	Function
156	Load preset 4	Pressing this button loads the 'PAL normal' preset memory. For details on the preset memories, see section **3.4.2**
157	Load preset 5	Pressing this button loads the 'PAL normal' preset memory.
158	Load preset 6	Pressing this button loads the 'PAL normal' preset memory.
159	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 152-155**)

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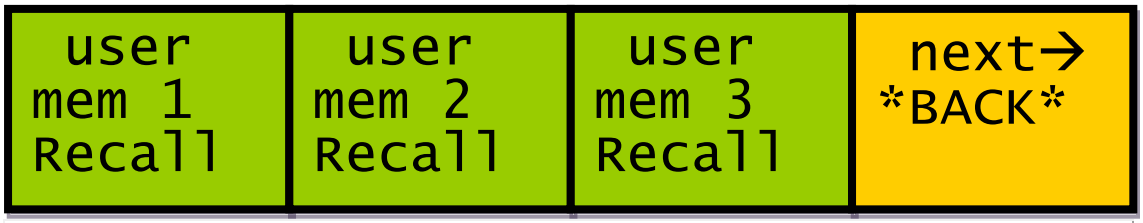
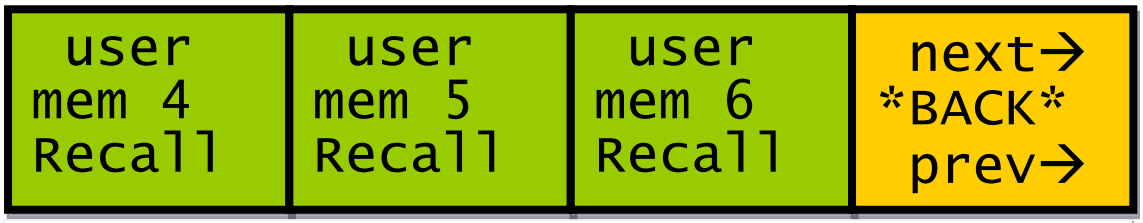
Menus 160-163: User memories menu 1/4



Menu Num.	Heading	Function
160	Load user memory 1	Pressing this button loads the first user memory. For details on the user memories, see section **3.4.3**
161	Load user memory 2	Pressing this button loads the second user memory.
162	Load user memory 3	Pressing this button loads the third user memory.
163	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 164-167**)

Menus 164-167: User memories menu 2/4



Menu Num.	Heading	Function
164	Load user memory 4	Pressing this button loads the fourth user memory. For details on the user memories, see section **3.4.3**
165	Load user memory 5	Pressing this button loads the fifth user memory.
166	Load user memory 6	Pressing this button loads the sixth user memory.
167	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)

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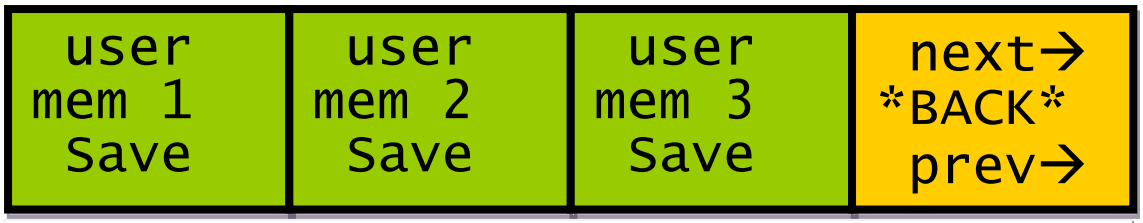
		Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 168-171**) Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 160-163**)

Menus 168-171: User memories menu 3/4



Menu Num.	Heading	Function
168	Save user memory 1	Pressing this button saves the current unit settings to user memory 1. For details on the user memories, see section **3.4.3**
169	Save user memory 2	Pressing this button saves the current unit settings to user memory 2.
170	Save user memory 3	Pressing this button saves the current unit settings to user memory 3.
171	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 172-175**) Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 164-167**)

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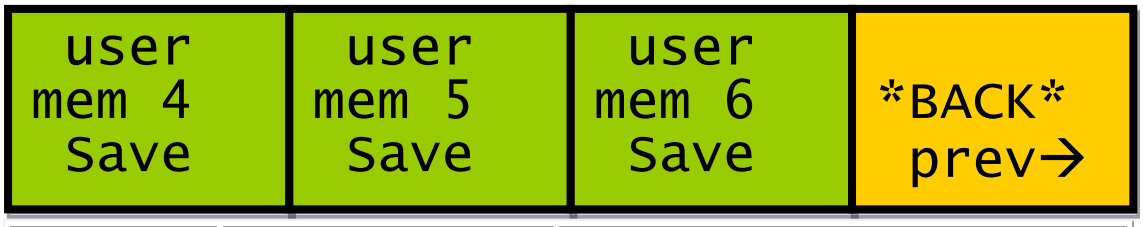
Menus 172-175: User memories menu 4/4



Menu Num.	Heading	Function
172	Save user memory 4	Pressing this button saves the current unit settings to user memory 4. For details on the user memories, see section **3.4.3**
173	Save user memory 5	Pressing this button saves the current unit settings to user memory 5.
174	Save user memory 6	Pressing this button saves the current unit settings to user memory 6.
175	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 168-171**)

Menus 176-179: KARMAudioRT Limits menu – this menu is only operational with the KARMAudioRT option (-K)

Menu Num.	Heading	Function
176		
177	Loudness Menus	Pressing the button takes you to the Loudness processing menus (Go To **Menus 248-251**)
178	Peak Menus	Pressing the button takes you to the Peak processing menus (Go To **Menus 240-243**)
179	Back	Pressing the button takes you to the previous level of menus (Go To

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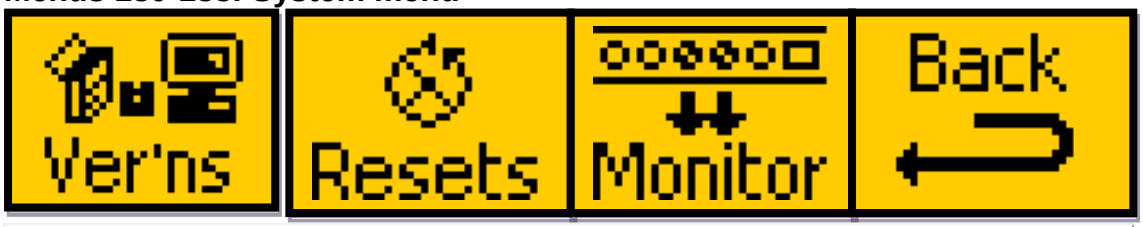
		Menus 12-15) Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 0-3**)

Menus 180-183: System menu



Menu Num.	Heading	Function
180	Versions menu	Pressing the button takes you to the versions menu, which includes the software upgrade menu (Go To **Menus 184-187**)
181	Resets menu	Pressing the button takes you to the unit resets menu (Go To **Menus 188-191**)
182	Monitor Output settings	Pressing this button takes you to the input and output settings menu (Go To **menu_224**)
183	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 08-11**)

Menus 184-187: Software menu

Menu Num.	Heading	Function
184	**LE-2** version number	This menu displays the version number of the **LE-2**
185	---	---
186	Upgrade software menu	Pressing the button takes you to the upgrade software menu (Go To **Menus 192-195**)
187	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 180-183**)

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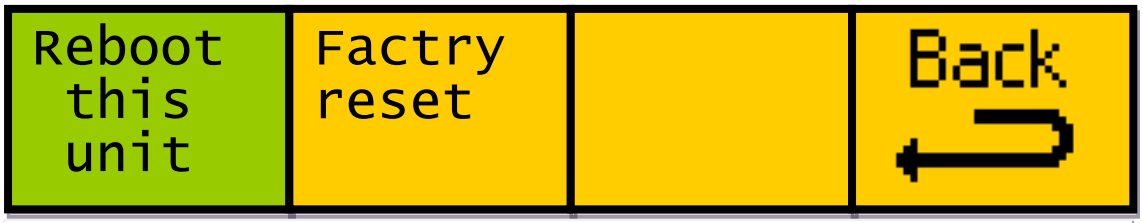
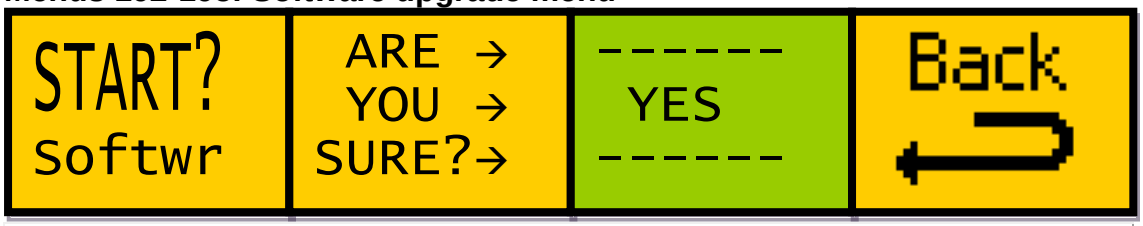
Menus 188-191: Resets menu



Menu Num.	Heading	Function
188	Reboot unit	Pressing this will reset the **LE-2**. The unit should finish rebooting within 30 seconds or so, and it should have the same settings loaded as it had before the reset button was pressed.
189	Factory reset	Pressing the button takes you to the factory reset menu (Go To **Menus 196-199**)
190	---	---
191	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 180-183**)

Menus 192-195: Software upgrade menu



Menu Num.	Heading	Function
192	---	---
193	---	---
194	Software upgrage confirmation	Pressing this button will confirm you want to update the software of the **LE-2**, and will jump to the message displayed on **Menus 200-203**. The details of the update procedure can be found in section **3.8**
195	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 184-187**)

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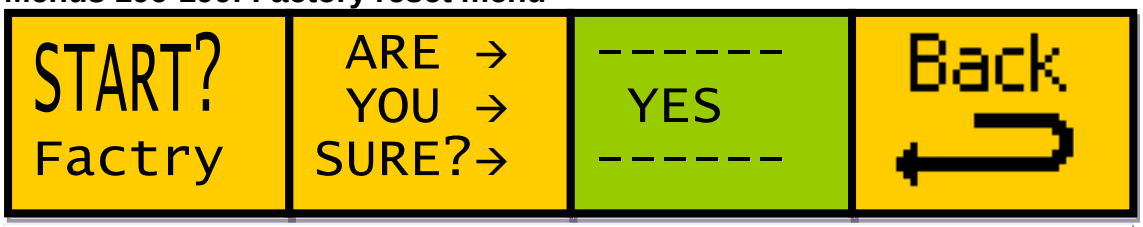
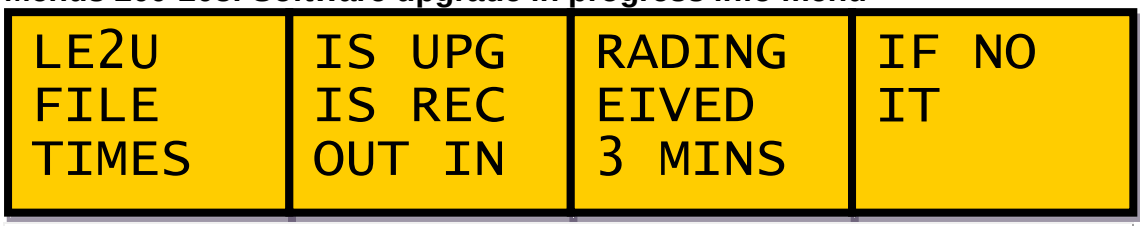
Menus 196-199: Factory reset menu



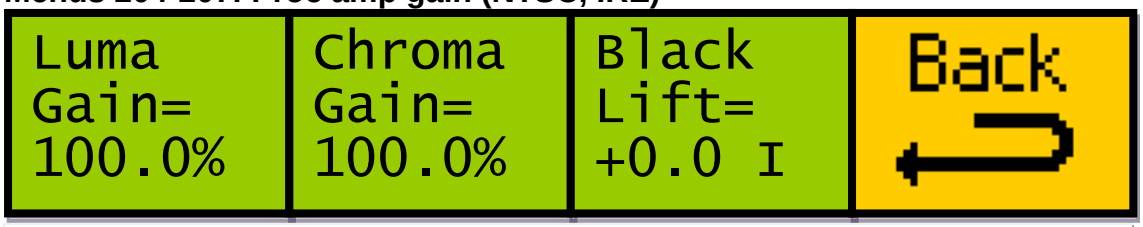
Menu Num.	Heading	Function
196	---	---
197	---	---
198	Factory Reset confirmation	Pressing this button will confirm you want to perform reset the **LE-2** to its factory settings. The menu icon will change to 'please wait' while the action is performed. **WARNING!** Performing a factory reset will permanently erase all user memories that have been stored, as well as erasing the current power-on state.
199	Back	Pressing the button takes you to the previous level of menus (Go To Menus 188-191)

Menus 200-203: Software upgrade in progress info menu



Menu Num.	Heading	Function
200	---	---
201	---	---
202	---	---
203	---	---

Menus 204-207: Proc amp gain (NTSC, IRE)



Menu Num.	Heading	Function

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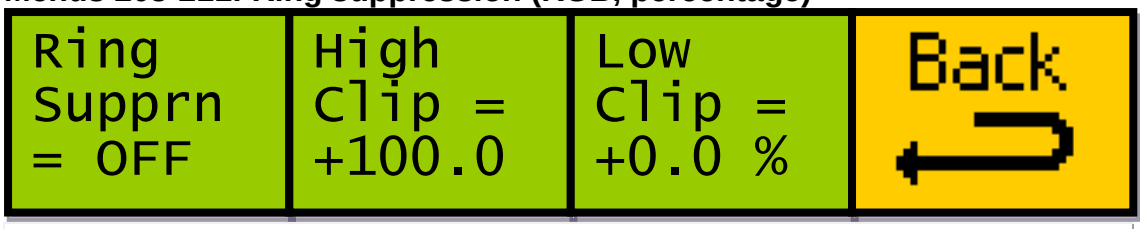
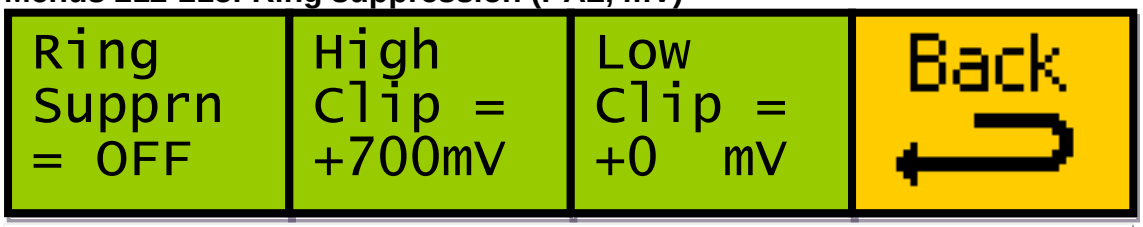
204	Luma gain adjustment	This menu adjusts the luma gain between 0% and 200%.
205	Chroma gain adjustment	This menu adjusts the chroma gain between 0% and 200%.
206	Black lift	This menu adjusts the black lift between -30.0 IRE and +30.0 IRE.
207	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 16-19**)

Menus 208-211: Ring suppression (RGB, percentage)



Menu Num.	Heading	Function
208	Ring suppression status	This menu cycles the Ring suppression between off, on and auto. For more information on the ring suppression, Go To **3.3.1**
209	Ring suppression high clip	This menu sets the value for the high clip limit of the ring suppression. Values are in percent.
210	Ring suppression low clip	This menu sets the value for the low clip limit of the ring suppression. Values are in percent.
211	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**)

Menus 212-215: Ring suppression (PAL, mV)



Menu Num.	Heading	Function
212	Ring suppression status	This menu cycles the Ring suppression between off, on and auto. For more information on the ring

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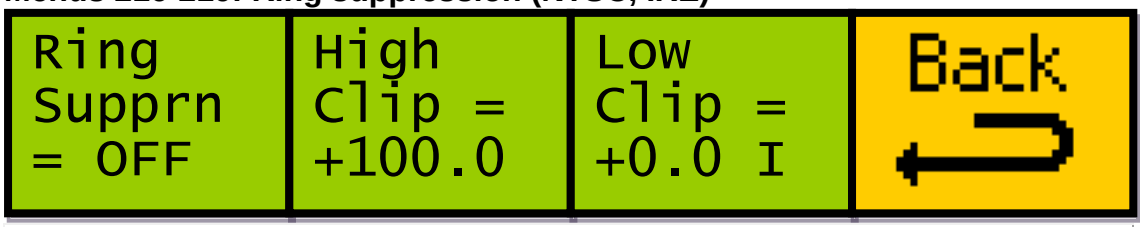
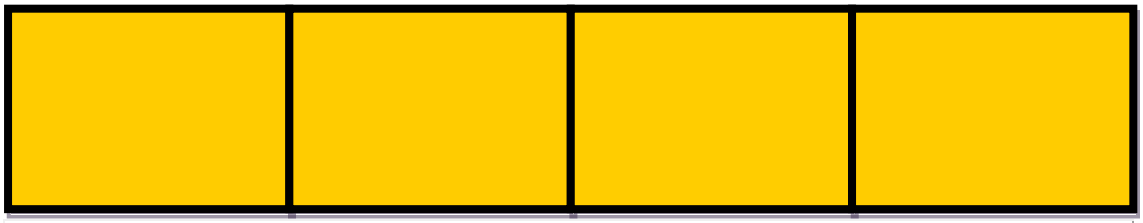
		suppression, Go To **3.3.1**
213	Ring suppression high clip	This menu sets the value for the high clip limit of the ring suppression. Values are in mV.
214	Ring suppression low clip	This menu sets the value for the low clip limit of the ring suppression. Values are in mV.
215	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**)

Menus 216-219: Ring suppression (NTSC, IRE)



Menu Num.	Heading	Function
216	Ring suppression status	This menu cycles the Ring suppression between off, on and auto. For more information on the ring suppression, Go To **3.3.1**
217	Ring suppression high clip	This menu sets the value for the high clip limit of the ring suppression. Values are in IRE.
218	Ring suppression low clip	This menu sets the value for the low clip limit of the ring suppression. Values are in IRE.
219	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**)

Menus 220-223: Not used



Menu Num.	Heading	Function
220	Not used	
221	Not used	
222	Not used	
223	Not used	

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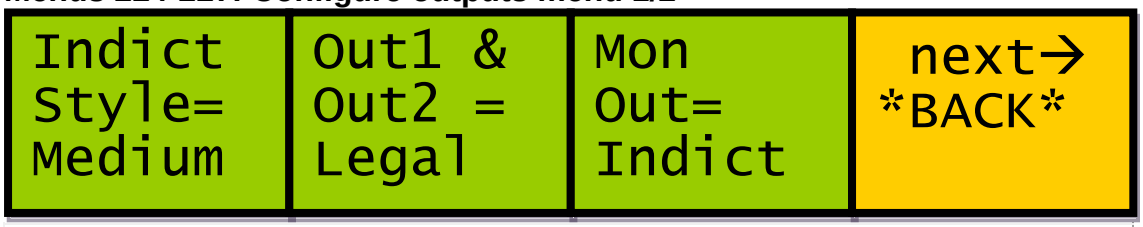
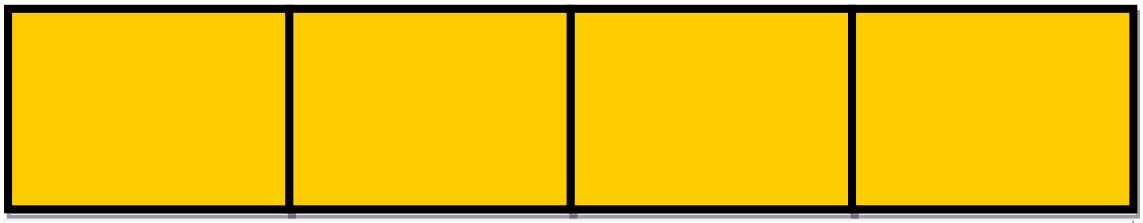
Menus 224-227: Configure outputs menu 1/2



Menu Num.	Heading	Function
224	Output video link mode	This menu toggles the output video mode between single and dual-link. For more information on the output video settings, Go To **3.2.6**
225	Output 1 type	This menu sets the type of output video to be present on output 1 of the i/o card. Options are Legal, Raw or Indicate.
226	Output 2 type	This menu sets the type of output video to be present on output 2 of the i/o card. Options are Legal, Raw or Indicate. If the output video link mode is set to dual-link, this menu will be automatically set to the same as output 1.
227	Back	Pressing the button takes you to the previous level of menus (Go To **Error! Reference source not found.**)

Menus 228-231: Not used



Menu Num.	Heading	Function
228	Not used	
229	Not used	
230	Not used	
231	Not used	

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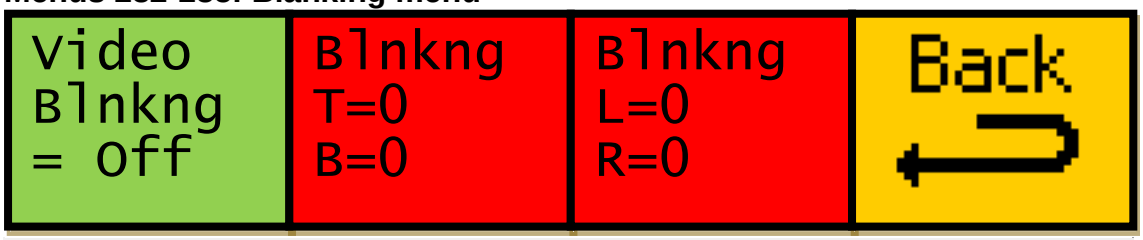
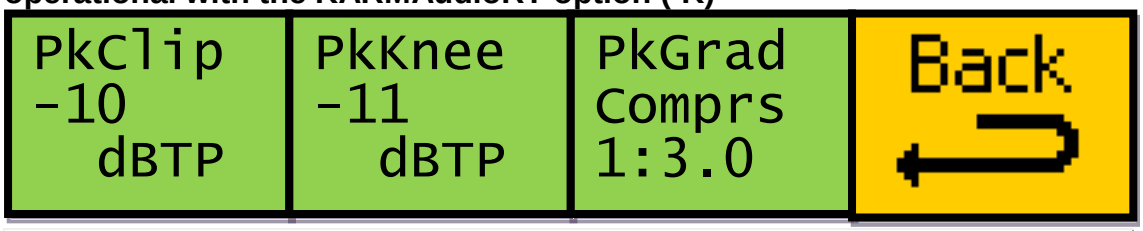
Menus 232-235: Blanking menu



Menu Num.	Heading	Function
232	Blanking status	This menu the video blanking to On or Off. See section 3.3.2 for more information.
233	Top	This menu sets the number of lines that are blanked from the top of the picture. See section 3.3.2 for more information.
233	Bottom	This menu sets the number of lines that are blanked from the top of the picture. See section 3.3.2 for more information.
234	Left	This menu sets the number of pixels that are blanked from the left of the picture. See section 3.3.2 for more information.
234	Right	This menu sets the number of pixels that are blanked from the right of the picture. See section 3.3.2 for more information.
235	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**).

Menus 240-243: KARMAudioRT Peak processing menu – this menu is only operational with the KARMAudioRT option (-K)



Menu Num.	Heading	Function
240	Peak Clip	This menu sets the level at which the audio peaks are clipped at in dBTP
241	Peak Knee	This menu sets the level at which the audio peaks start to be adjusted as per the gradient in menu 242 in dBTP
242	Peak Compression	This menu sets the ratio of the slope

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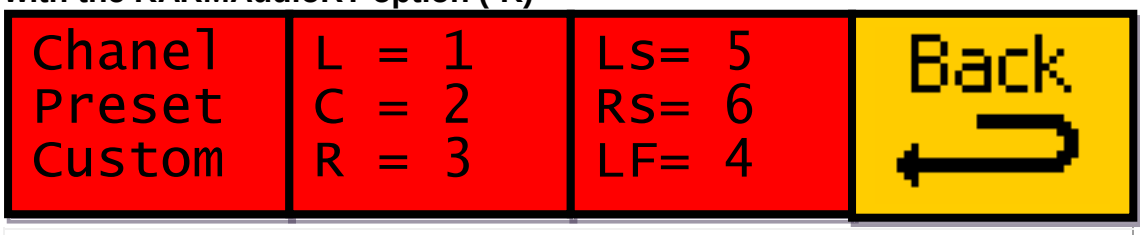
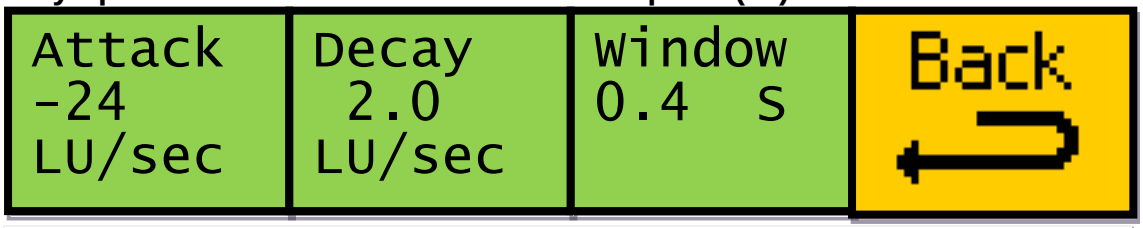
		at which the peak is reduced by after the knee level has been reached in dBTP.
243	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 176-179**)

Menus 244-247: KARMAudioRT Channels - this menu is only operational with the KARMAudioRT option (-K)



Menu Num.	Heading	Function
244	---	---
245	L, C, R Chanel Numbers	Sets the embedded audio channel numbers for channels Left, Centre and Right. Setting 0 disables that channel in the loudness calculation and true-peak correction
246	Ls, Rs and LFE Channel Numbers	Sets the embedded audio channel Numbers for channels Left Surround, Right Surround and Low Frequency Effects. Setting 0 disables that channel in the loudness calculation and true-peak correction. The LFE channel is never included in the loudness calculation but is subject to loudness and true-peak correction if not set to 0
247	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**)

Menus 248-251: KARMAudioRT Loudness processing menu – this menu is only operational with the KARMAudioRT option (-K)



Menu Num.	Heading	Function
248	Attack Rate	This adjusts the attack rate of the loudness correction in loudness units per second

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249	Decay Rate	This adjusts the decay rate of the loudness correction in loudness units per second
250	Window	This is the duration of the averaging window used to determine the short-term loudness of the source audio
251	Back	Pressing the button takes you to the previous level of menus (Go To **Menus 176-179**)

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5 Technical Appendix

5.1 GPI/Tally/RS232 technical information.

The Processor card has an RJ-45 connector with GPI, Tally and RS232 connections as shown below:

1	GPI 1	White/Orange
2	Not Used	Orange
3	GPI 2	White/Green
4	GND	Blue
5	RS232 TX	White/Blue
6	RS232 RX	Green
7	LTC-	White/Brown
8	LTC+	Brown

Table 1: GPI/LTC and RS232 pin-out on RJ-45.

5.1.1 RS232 Interface.

This loosely follows the pin convention of EIA-561 which is a standard for RS232 on an RJ45 cable. Only TX, RX and Signal ground (pin 4) are implemented. For the **LE-2** the following RS232 parameters apply:

- 115Kbaud
- 8 Bits, no parity
- 1 Stop bit.

5.1.2 LTC (Linear Time code) Interface.

This unit takes in standard balanced LTC at -10dB to +10dB level. The user can ground the LTC- side for unbalanced use, just using ground and the LTC+. This interface is only designed for LTC at unity play speed and will not track fast shuttling timecode.

5.2 On-Board automation protocol

5.2.1 Implimentation on RS232

A simple text based protocol has been implemented on the RS232 interface. All text strings are shown in inverted commas; do not include them in the actual command sent. Each byte within a text string must be sent within 10mS of each other or the command will time out. This on-board protocol is not the same as the **geNETics** protocol. Refer to the **geNETics** protocol in section 6 (Product

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Automation) of the etherbox manual. **GeNETics** protocol is used to control a number of processor cards using one connection.

PLEASE NOTE – These commands are only active if the LOGGING mode is set to OFF (see Section **Error! Reference source not found.**). If a user preset is ecalled that sets LOGGING back to ON these commands will become inactive again.

The command set is as follows:

Command	Meaning	Example hex string
“Mnn”	(M)emory, nn is the memory/preset number	4D,30,31 Select Memory 01, which is the PAL preset. The number represents the following: M01= PAL preset M02= NTSC preset M03= Bypass all Processing M04= 0-100% RGB M05= EBU103 tight preset M06= EBU103 optimum preset M07→M12=User Presets 1→6. Initial preset number depends on line standard. (See User Memories 3.4.3)

A response will occur within 100mS of the command. The responses are as follows:

Response	Meaning	Hex string
“OK”	Command was understood and will implement.	4F,4B
“E0”	Command timed out.	45,30
“E1”	Error 1. Unknown command.	45,31
“E2”	Error 2. Memory number is not in range.	45,32

5.3 Technical Specification

5.3.1 Description

Provides legalisation of the SD (Standard Definition version), SD/HD (Multi-rate version) or dual link (4:4:4) (Dual Link version) input signal with full 10 bit processing throughout.

NOTE: Indicate output is NOT available in dual link output mode.

5.3.2 Features

- Composite, YUV and RGB colour spaces and combined RGB+composite with two independent outputs for "Legalise" and user controllable "Legal/Indicate”.
- Adjustable clipping levels and soft clipping knee levels.
- Integral luma and chroma gain, black level adjustment & hue rotation.

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- EBU-R 2003 standard SDI legalisation settings and 7.5 IRE or 0 IRE Pedestal with 6 user memories and common presets.
- Log output with timecode and PC viewer programme. Automation Port using simple protocol for presets/memories
- Unique severity display mode on monitoring output.
- Firmware and software fully updatable by file upload*
- Mechanical relay bypass option available.
- Optional web based java soft panel and specific "web app" available.*

*Not available on the MX-9 chassis

5.3.3 Formats

- **Standard Definition version** - 625/50, 525/59.94
- **Multi-rate version** - 625/50, 525/59.94, 1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i, 720p/23.98/24/25/29.97/30/50/59.84/60
- **Dual Link version**

Single Link –
625/50, 525/59.94,
1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i,
720p/23.98/24/25/29.97/30/50/59.84/60
Dual-Link 4:4:4 -
1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i,
720p/23.98/24/25/29.97/30/50/59.84/60

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